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ABSTRACT

Business process redesign (BPR) is a multifunctional, interdisciplinary, and strategic business improvement methodology designed to improve service, costs, and quality. This book provides a conceptual framework for institutions of higher education to shape such an improvement effort including examples of BPR activities and tools. Chapter 1 describes BPR's underlying philosophy. Chapter 2 presents a three-phased conceptual framework from which college/university analysts can develop their own unique approach to change. Within each phase, step-by-step tasks suggest when, where, and how institutions can weave together technological solutions, process improvement techniques, and change management strategies. Chapter 3 provides analytical tools that assess the "as-is" process and generate redesign ideas. These tools include, among others, work distribution analysis, process flowchart analysis, and cost of quality analysis. This process identifies why and how work is currently done to identify the critical components of the future process design. Chapter 4 shows the results of BPR analyses, as well as the expected benefits. The examples encourage teams to look beyond the initial task of data collection to the subsequent tasks of data analysis, conclusion formation, and recommendation development. A glossary and three appendixes, containing sample work distribution charts, samples of process flowcharting, and sample customer analysis surveys, conclude the book. (JDD)

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Business Process Redesign

for Higher Education

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National Association of
and University Business

Business Process Redesign for Higher Education

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Preface

Over the past several years, the National Association of College and University Business Officers (NACUBO) has undertaken an aggressive agenda to support its membership in their efforts to manage the cost pressures presented by the current environment. NACUBO's principal goal has been to provide institutions with practical tools that can help them improve quality and reduce costs.

Most notably, NACUBO has been at the vanguard of creating a national database of business indicators enabling participating institutions to "benchmark," or quantitatively compare, their operations to others. Since 1991, the NACUBO and Coopers & Lybrand benchmarking study—Operational Benchmarking for Quality Improvement and Cost Management in Higher Education—has included more than 300 institutions covering 40 functional areas and over 600 different benchmarks. Through comparison to others, institutions can identify areas with the greatest need for improvement—the areas where improvement efforts should focus first. Even better, institutions can identify sources for improvement ideas—other colleges or universities with more accurate customer service measurements, outstanding quality, faster processing times, more effective automation, or lower costs. Thus, benchmarking serves as a springboard for further action.

To help institutions launch that action, NACUBO commissioned *Business Process Redesign for Higher Education*. Business process redesign (BPR) is a multifunctional, interdisciplinary, and strategic business improvement methodology designed to help institutions improve service, costs, and quality. This book is intended to accomplish two objectives. First, it provides a conceptual framework for institutions to shape such an improvement effort. How should one approach this type of change? What are the major steps? Who should be involved? What major issues must be addressed for successful implementation? Chapters I and II provide senior leaders of institutions with the background and structure necessary for a BPR effort. Second, the book provides examples of BPR efforts and detailed explanations of BPR tools. Chapters III and IV provide managers with the practical tools and practical examples necessary for beginning BPR.

Coopers & Lybrand first published its own *BreakPoint Business Process Redesign* in 1992, primarily for use in the corporate sector. Although higher education is often burdened with the same external pressures as the corporate sector, its customer needs, culture, and core business are quite different. Thus, the firm's Higher Education Consulting Practice adapted the BPR methodology over the past several years for application in the higher education industry. The authors have tried and tailored this methodology over and over again with a wide variety of college and university clients. The products of these efforts are captured in this book and are based on proven results rather than proposed theory. *Business Process Redesign for Higher Education* recognizes the unique challenges facing institutions and provides an approach to support the rigorous and undaunted pursuit of improvement.

Introduction

Purpose and Organization of This Book

This book is for senior management, BPR team members, and others who are interested in understanding and applying BPR to higher education. As such, it serves a dual purpose. The first is to enhance comprehension of business process redesign and translate a popular and effective corporate methodology into a methodology specifically designed to meet the unique needs of higher education. The second is to give educators and administrators a toolkit that has been tried and tested in higher education. This toolkit, combined with a three-phased methodology, provides institutional managers with the information and resources that will enable them to start addressing the extraordinary confluence of today's external issues.

Chapter I describes the underlying philosophy of BPR. Philosophy and theory, however, are intellectual abstractions and do not translate easily into practical applications. Chapter II presents BPR theory as a three-phased, conceptual framework from which college and university analysts can develop their own unique approach to change. Within each phase, step-by-step tasks suggest when, where, and how institutions can weave together technological solutions, process improvement techniques, and change management strategies. These work steps should be viewed as an overarching blueprint for implementing change. The unique culture and situation of each institution will dictate ways to tailor the blueprint to meet differing needs. As such, the methodology should not be viewed as a lock-step approach to BPR. Rather, senior managers should draw their own conclusions and apply those elements that will work best at their own institutions. Chapter II can be especially useful to institutions as they begin to plan for BPR and can serve as a checklist to administrators charged with overseeing the effort.

One of the success factors of BPR is its reliance on solid data to develop the agenda for change. The data needed to develop the case for change are not readily available in current institutional databases. Rather these data are developed through the use of specific tools. Chapter III provides BPR teams with a set of analytical tools that are at the very center of assessing the "as-is" process and generating redesign ideas. Each tool deepens the team's understanding of the issues inherent in the current process and identifies ways to do things differently and better. Although some may argue that analyzing a process that will ultimately be thrown away is a waste of time, the compilation of data (process profile) that describes the "as-is" process is part of the change management strategy, as it convinces management, process participants, and others of the need to change—it is difficult for those who want to resist change to defend the status quo in the face of facts. Additionally, the institutional manager must understand why and how work is currently done to identify the critical components of the future process design. Careful documentation of the as-is process targets the breakthrough opportunities.

Chapter IV shows the results of BPR analyses, as well as the expected benefits. This chapter provides managers insight into the level of change that can be accomplished with BPR and also provides an important source of ideas for BPR team members. By reviewing concrete examples contained herein, BPR team members will gain insights that can help them in their own process analysis. The examples encourage teams to look beyond the initial task of data collection to the subsequent tasks of data analysis, conclusion formation, and recommendation development. Each example demonstrates how individual tools applied to a process analysis coalesce to form a powerful argument for change.

Chapter I

Why Business Process Redesign?

Over the past several years, corporate America has embraced re-engineering strategies, turning their organizations on their sides by placing customers at the center and flattening organizational hierarchies. This dramatic rethinking is driven by major shifts in the external environment. Currently, dozens of authors contend that BPR is the answer to corporate challenges such as increased competition, higher customer demands, emergence of new technologies, and the presence of constant and rapid change.

Hammer and Champy, in their book *Reengineering the Corporation: A Manifesto for Business Revolution*, explain that the old principles of organizing around Adam Smith's division of labor must give way to organizing around processes. Redesign enables organizations to reunite severed links between fragmented and seemingly unrelated activities. Once a process can be viewed from the customers' perspective, activities that do not add value can be eliminated.

The vast number of writers urging corporate America to abandon dated management principles provide compelling arguments to re-engineer.

External Trends Require Extraordinary Response

Three external forces are driving change in higher education: an acute cost crisis, an increasingly demanding customer base, and an erosion of public confidence. These forces are affecting all sectors of the economy, not just higher education. Improving customer satisfaction and winning back public confidence within the framework of structural financial disequilibrium will be a major challenge for colleges and universities.

Cost Crisis

With each passing day, the news from the higher education front appears to worsen. The industry is experiencing a funding and cost crisis that is long term and structural in nature. Deep cuts in state appropriations to public institutions, combined with decreasing parental and student ability to pay tuition bills, have severely constrained the revenues of virtually all colleges and universities. The potential pockets of offsetting revenues such as fund raising, investment income, or research grants are increasingly scarce. Compounding the revenue squeeze are the ever-growing operational costs of the 1990s, including faculty and staff salaries, fringe benefits, technological investments, deferred maintenance that is coming due, and other capital expenditures. These seemingly unconstrained expenses all form a voracious institutional appetite for resources that are already scarce.

Although the revenue and expense conundrum is not new to higher education, the acuity of the problem is. As George Keller has pointed out:

> "American colleges and universities occupy a special, hazardous zone in society, between the competitive profit-making business sector and the government owned and state run agencies. They are dependent yet free; market-oriented yet outside cultural and intellectual fashions. The faculty are inventors, entrepreneurs, and retailers of knowledge, aesthetics, and sensibility yet professionals like the clergy or physicians. The institutions pay no taxes but are crucial to economic development. Business is conducted much like European institutions of learning in the Renaissance, still proud and pedantic as Rabelais saw those forerunners; yet modern corporations pay these ivory towers to sniff out the future. They constitute one of the largest industries in the nation but are among the least businesslike and well-managed of all organizations. Whatever, like large animals in a bleak landscape, they are

perpetually in search of vital financial nourishment."[1]

And with unprecedented urgency, colleges and universities continue to scour an increasingly "bleak landscape . . . in search of vital financial nourishment" —financial nourishment that may not be readily forthcoming. At many institutions, however, there is a growing recognition that the enterprise will need to operate differently: more effectively, and more accountably.

With revenues maximized at most colleges and universities, institutions have resorted to traditional expense-cutting endeavors that trim around the margins of the enterprise but rarely challenge the core of the operation. Yet, most of the financial problems confronting higher education are structural in nature and long term in duration. Hence, "getting through another budget cycle" deals only with the short-term symptoms of the problem, not the fundamental issues underlying the symptoms.

Customer Demands

This cost crisis comes at a time during which colleges and universities are facing an increasingly demanding customer base and are feeling the need to invest more money to satisfy expanding customer demands. In the consumer goods market, the simple equation of supply and demand has shifted the focus of power from firms to customers. After World War II, when material goods were in short supply, American consumers willingly purchased whatever goods were available. In today's market, in which there are more products than customers, consumers are demanding higher-quality products, a better level of customer treatment, and efficient service. Businesses are now turning themselves inside out to give their customers excellent products accompanied by superior services. Companies have learned that by creating demonstrably superior products and providing superb customer service, it is possible to achieve higher profits and greater success.

This increased demand for high-quality services and products has implications for colleges and universities, as well as other public sector entities. Just as consumers demand and are provided increased quality and attention from companies in the private sector, society is demanding more of its institutions, including healthcare services, higher education institutions, social services, and government itself.

These demands are being expressed in countless ways by higher education's countless customers. Firms that hire college graduates seem to be increasingly dissatisfied with the incoming workforce. Some entities that fund research are becoming more specific and are demanding that universities produce applied research that relates directly to American business. Students and their parents have grown to expect elaborate student services in return for high tuition prices. Customers for administrative services no longer tolerate extensive time delays. For their institutions to survive, managers need to talk to their customers; understand their customers' needs; and restructure education, research, and public service programs to meet those needs. In addition, unless higher education is able to respond to the demands of its primary customers, other entities may fill the gap. At one extreme, Motorola is suggesting that it will institute Motorola University to meet its need for a trained, educated workforce. And ITT has invested $60 million in ITT Tech to form a private career-focused program as a fulfillment of ITT's "vision for a system of higher education that prepares students to meet the demands of American businesses."[2]

Public Confidence

A third external trend is the pronounced crisis of confidence in American institutions that has led to growing intrusion by the public. For example, politicians are being held to a higher standard. The pay scales of CEOs are being questioned and debated in the press as well as in the boardroom. The entire healthcare system is under attack and is being addressed by a national task force that intends to alter several fundamental assumptions upon which the system was founded.

Increased public scrutiny of the way business is conducted in all sectors of the economy is profoundly affecting higher education's climate. The Department of Justice has investigated how independent colleges and universities have set tuition

1. Keller, George, *Academic Strategy: The Management Revolution in American Higher Education*, Baltimore: The Johns Hopkins University Press, 1983, p. 5.

2. ITT Advertisement, *Economist*, Volume 329, No. 7838, Nov. 20–26, 1993, p. 32.

prices. Increasingly, state legislatures are seeking greater accountability for the funds they invest in education. Governing boards are taking more responsibility and demanding better performance. This crisis of confidence is swelling. Simply hoping it will go away will not make it disappear. Unless colleges and universities undertake proactive activities to correct perceived inefficiencies by improving core processes, this external scrutiny will doubtlessly continue and may intensify. Add to these issues the existence of rapid and constant change throughout the industry, and the fact that the world economy is in the midst of a transition from the industrial age to the information technology age, and the environment for higher education is made even more complex.

There are two messages here for higher education. The first one is that the challenges it faces are affecting all sectors of the economy. Responses from the federal government (*Reinventing Government*, 1992, Osborne and Gaebler) and the corporate sector (*Re-engineering Your Business*, 1993, Morris and Brandon) provide successful strategies that can be tailored to higher education. Business process redesign has yielded impressive results in the manufacturing and service sectors and provides promise for colleges and universities.

The second message is that the three trends described above are fundamentally and dramatically different from issues and problems addressed before now. Unlike previous temporary one-time cost issues, the current cost issues are structural and long term. The increased customer appetite for high-quality programs and services cannot be resolved with minor tinkering and will not go away. The lack of confidence in higher education is expanding, endangering the entire industry—and may ultimately require industrywide responses. In summary, the chaotic, rapidly changing world will only grow more complex, more quickly.

How have colleges and universities responded to these challenges? Some have responded by focusing on the budget in ways that symptomatically address year-to-year unprofitability. These budget-focused strategies, however, are not designed to change the fundamental assumptions and division of labor principles upon which higher education administration is built. Across-the-board cost-cutting measures simply reduce the number of people available to do the work. These measures do not eliminate work. Employees left behind bear the stress of doing more with fewer resources. Ultimately, if funds are restored, the size of the administrative staff springs back to its original size. Campuswide temporary budget freezes are detrimental to the quality of campus programs and services. Critical, value-added services and programs are affected to the same degree as nonessential programs. This strategy reduces all services to the lowest common denominator and does not allow strategic investments to be made. Following this way of thinking to its natural conclusion, certain types of expenditures may be curtailed, some layoffs may occur, and another budget may be thinly balanced for another year.

Recognizing increased customer demands, some institutions have worked to improve customer service, though often the customer is narrowly defined and the exercise is conducted without achieving sustainable cost reductions and structural change. Some institutions have taken a longer view by launching total quality management (TQM) programs in response to the many success stories emanating from the corporate sector. TQM is a set of principles, goals, tools, and procedures that can help an organization, over the longer term, amass many improvements in quality, customer service, timeliness, and cost, especially through the effective involvement of all employees. Although an extremely useful tool, TQM may not provide the dramatic, rapid change required at many institutions.

What Is Business Process Redesign?

Business process redesign is defined as a managerial approach that holistically incorporates institutional strategy, work processes, people, and technology to improve performance radically and to create sustainable competitive advantage by challenging and redesigning the core business processes of an institution using operational, technical, and change management in a unified way. BPR is customer-driven, data-intensive, and results-oriented. It challenges the fundamental infrastructure of an organization and is used when a new way of doing business is required.

To illustrate what is meant by *radical* improvement, a comparison of BPR and TQM can help. Although BPR and TQM share similar characteristics, there are some fundamental differences. TQM is typically an institutionwide effort with the stated goal of continuously improving the existing processes of a college or university through organi-

zationwide performance enhancement. Under this approach, the status quo is the basis for improvement. In other words, it is built on the premise that the process is fundamentally "OK," and that tinkering around the edges is sufficient to bring it to the required level of quality. The results of TQM are evolutionary and incremental. To use a baseball analogy, taken together, over the long term, these "base hits" can achieve significant results. BPR, in contrast, achieves results quickly by hitting "home runs." It is revolutionary and accomplishes breakthrough change. It can fix a process when a large gap exists between the current performance of the process and the expectations of its customers. BPR challenges the fundamental assumptions upon which a process is based. In a BPR effort, a process is mapped to understand its intricacies and to identify underlying issues. The current process is then scrapped and designers begin with a clean slate.

There are several critical words in the BPR definition. First and foremost is the word holistic. BPR begins and ends by linking institutional strategy and vision to expressed customer needs and to the processes by which these needs are met. It starts by asking the question: "How does this organization create value for customers?" Simply stated, this means that the organization must identify its core processes and learn from its customers whether those processes meet customers' expressed needs. In the world of BPR, value—as defined by an institution's customers—is composed of four variables:

$$\text{Value} = \frac{\text{Increased Quality} \times \text{Increased Customer Satisfaction}}{\text{Reduced Time} \times \text{Reduced Cost}}$$

As the equation above expresses, customers are seeking increased quality, increased service satisfaction, reduced response times, and reduced costs, ultimately leading to increased value. Customers judge whether or not they are receiving value from the services rendered by higher education. The institution can seek feedback from its "external" customers, including its students, board, legislators who provide funding, government agencies or businesses that fund research, businesses that hire students, or graduate and professional schools that admit students for advanced study. Customer feedback may indicate that the institution should rethink aspects of its academic strategy. For example, customers' expectations and requirements may indicate a need to redesign or restructure the curriculum.

In addition to seeking input from its customers, an institution's strategic assessment includes competitor analysis, an analysis of environmental trends, and strategic benchmarking. These efforts are used to gain information about competitors to prioritize competing projects and to develop an overall game plan to meet customer needs in the long term. These efforts focus on the one-to-five year plan of the organization and its competitors by evaluating goals, new projects or products, new ventures, and industry trends.

Based on a thorough analysis of the overall external and internal environment and the input of its customers, an organizational vision and strategic plan provides the context (and often the basis for change) that drives the BPR effort.

Of course, another critical word in BPR is process. BPR is a relentless focus on work, work processes, and the inputs and outputs of those processes. It moves an institution to look beyond departmental boundaries to identify the start of a particular process, then tracks and maps the process through a labyrinth of signatures and sign-offs, all the way to the final output. Universities' processes produce diverse outputs such as "delivered goods," "published research," "educated students," and "recorded gifts." Uncovering the process that underlies the output is both the fun and challenge of BPR. Today, employees only see, understand, and work on a fraction of the total process. BPR pulls together fragmented tasks and activities, identifies redundancies and activities that have been added to the process over time, and seeks ways to improve the performance of the process without regard to departmental barriers. The ultimate goal of BPR is the breakdown of the rigid walls that divide functions—"functional silos." BPR is not about centralization versus decentralization. It is about how the process can be designed to deliver the most value at the least cost.

The third critical word is technology. In BPR, operational, business, and technical knowledge are simultaneously brought to bear on the redesign. It is the "simultaneous tracking" of process redesign, the search for best business practices, and the identification of a technological solution that distinguishes BPR from previous technological solutions. In the past, these efforts have been serial. Typically, the technology was identified and then re-engineered to fit the institution's existing processes, thus paving the proverbial cow path. In a simple example, changing an address on an em-

ployee's personnel record might be automated but still include four or five approvals, thus following the former manual process. While the technology is new, the process is the same—and still dysfunctional. In most cases, no thought or consideration was given to searching for industry best practices to set the standard for improvement or introduce new practices into the service delivery cycle. BPR avoids that mistake. By definition, BPR links process improvement to technology and ensures that the process is redesigned concurrently with the search for best practices and technological solutions. Experience has shown that the merger of technology and process improvement achieves a breakthrough in performance as the process is transformed.

A fourth critical phrase is change management. The human resource aspects of BPR must be specifically identified and addressed for the initiative to be successful. In the approach described here, aspects of change management are interwoven throughout the workplan, and specific steps are identified to bring issues to the surface and to develop organizational strategies to resolve these issues.

Results

BPR offers an avenue for the creation of sustainable, positive change. BPR enables college and university managers to reorient preconceived ways of thinking, identify core competencies and processes, get closer to their customers, and ultimately provide services that meet distinctly expressed needs in a cost-effective manner. BPR brings about the results with a speed and palpability that is commensurate with the urgency of improvement required by many institutions today. What are some of the bottom-line results achieved by BPR? A BPR initiative can produce:

- increased performance and improved quality;
- satisfied customers;
- improved competitive position;
- early identification of easy changes—substantial improvements, or "quick wins," are implemented in advance of the longer-term information technology (IT) solutions, providing immediate payback and reduced cycle time;
- a positive financial return on an organization's IT investment—as opposed to the customary status quo personnel levels and higher IT maintenance and operations costs commonly experienced in the past, when IT was implemented without BPR;
- streamlined processes that are easier to manage;
- better access to management information; and
- substantially reduced costs—depending on the business process, up to 50 percent cost savings have been identified in BPR projects.

In addition to the bottom-line results listed above, BPR helps institutions not only rethink what they do but how they do it. Old modes of thinking, including the very yardsticks used, are critiqued. It is through this rethinking and reorientation that BPR can play a pivotal role in reshaping an institution's administrative and financial thinking.

The traditional view of college and university operational costs has been functional and organizational. Institutional funds tend to be budgeted on a department-by-department basis with a clear emphasis on inputs. The implicit and prevailing assumption is that the more dollars invested in a department, division, or institution, the higher the level of quality that will be achieved. Hence, the traditional benchmarks of higher education tend to be input driven (e.g., instructional dollars spent/students; students/faculty; etc.). Few measures are output driven and, in many cases, the quality of the output is assumed.

If colleges and universities are to be sustainably successful in reshaping their cost structures, it is imperative to move away from the functional or organizational view of costs. The emphasis must move from inputs of resources into departments, to the work and outputs of those departments. The input of dollars to a department enables it to "purchase" a bundle of expertise, skills, and materials. The real challenge is to determine what the expertise, skills, and materials produce; how they produce it; what it costs to produce it; and how well it is produced. BPR embraces an output orientation guiding the institution to create cost-effective work processes to produce highly valued outputs. The shift to a different set of performance indicators may also help allay the concerns of an increasingly vocal public.

In summary, higher education is challenged to meet the needs of many external constituencies. Understanding value from the customers' perspectives pushes the institution to achieve decreased

costs, increased quality, improved timeliness, clear accountability, and greater customer satisfaction. BPR focuses on customer needs and expectations so that the institution's efforts may be channelled appropriately to obtain a real competitive advantage.

Constraints to BPR

Although the results of BPR are attractive, achieving these results may be an arduous task unless attention is paid to the current organizational culture and values. An institution often faces formidable barriers to achieving sustainable change by any methodology or approach, including BPR. For example:

- Organization structures support specialized functional fiefdoms that can thwart cross-functional solutions.
- Middle managers may resist BPR because the rules of the game after BPR are so dramatically different than the rules of the previous game (*their* game—they were promoted based on the ever-increasing size of their budgets or departments).
- Departmentally based, traditional budget processes do not encourage customer-focused or process-driven budget reductions.
- Higher education is not accustomed to the customer-oriented viewpoint required by BPR. For some institutions, the task of identifying the primary internal and external customers for its core processes challenges the commonly accepted notion of being many things to many people.
- BPR projects are data-driven and performance-oriented, yet in most institutions, minimal management information is available. At most institutions, a plethora of data exists, yet it is extremely difficult to transform this data into meaningful information, upon which decisions can be made.
- The human resource policies in higher education have created an environment that is not conducive to rapid and radical change. Taking the lead from the "academic side" where tenure reigns, the "administrative side" of many colleges and universities has implemented policies (often unwritten but nevertheless real) that provide a quasi-tenure to administrators and staff.

Taken together these characteristics can be daunting. Yet a successful BPR effort works through these obstacles by identifying underlying issues early and developing appropriate action plans.

Chapter II

Methodology

Overview

As demonstrated in chapter I, the acuity and pervasiveness of the issues facing higher education are compelling. Likewise, the prospective impact of BPR is enticing. But how does an institution actually lead and implement such a bold approach to change?

The answer to this question is found in BPR's three-phased methodology, which integrates all aspects of redesign, including work processes, technology, human resource issues, and customer needs. Each of these components must be aggressively addressed if the promise proffered by BPR is to be fulfilled. As an integrated management approach, summarized graphically in exhibit 1, BPR accomplishes breakthrough process improvements based on defined customer needs and powerful analytical tools. However, BPR is more than a set of neatly defined, quantitative analytical tools. Although the toolkit is important, these tools—in and of themselves—cannot form the basis for change. Unsuccessful institutions will have leaders who hand off to managers the tools presented in chapter III, sit back, and wait for change to miraculously occur.

Successful institutions will form an appropriate organizational structure to drive the process; will commit the substantial time and energy required; will boldly tackle a broad, important process; and will break down organizational barriers that can stymie change. Thus, the decision to use a structured methodology that incorporates the complex components of change distinguishes successful efforts from unsuccessful ones. Originally developed and implemented in the corporate sector by Coopers & Lybrand, BPR has been tailored to meet the unique needs and culture of higher education. The methodology has been used successfully by several colleges and universities to redesign processes that are critical to the operation of each institution. BPR helps institutional managers structure their improvement efforts with a strong bias toward results and action.

The overall objectives of each phase are:

Phase I. Discover. Build sponsorship, lay the foundation for change, identify and prioritize opportunities to improve the institution's administrative process radically, and create the business case for change.

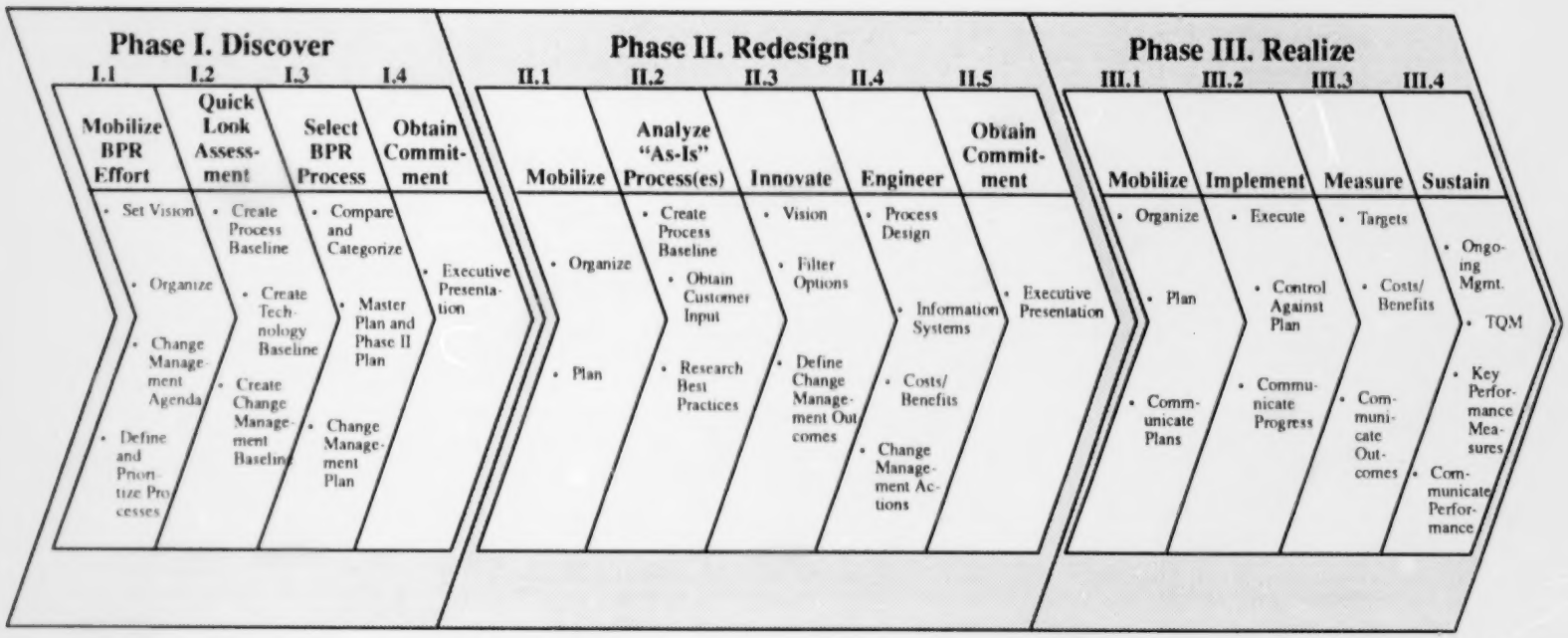
Phase II. Redesign. Analyze the selected process(es) in detail, identify technological solutions to enable change, innovate, redesign, and develop implementation plans.

Phase III. Realize. Finalize implementation plans, and then implement the redesigned process, including changes in policies, organization, work procedures, staff assignments, staff displacement, training, and technology.

Although this methodology is an organized approach for creating dramatic change, it is not a standard road map. Each institution must tailor the methodology to meet its own unique goals, customer needs, and culture. This chapter provides the broad framework for BPR and also delves deeper to describe the major tasks in each phase. Using this framework, institutional managers can adapt the methodology for successful implementation on their own campuses.

Executives may read this chapter to gain a general understanding of how BPR works and to identify the particular approach that will be successful at their own institutions. Middle managers and BPR team members may read this chapter to understand the more detailed activities and responsibilities in BPR and to glean helpful recommendations (and pitfalls to avoid) in managing a BPR effort.

Exhibit 1.
Three-Phased Approach to BPR for Higher Education



Source: Coopers & Lybrand BreakPoint™ BPR methodology

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Phase I: Discover—Identify and "Size" the Opportunities

The goal of Phase I is to build sponsorship and select the processes to be redesigned based on specific, quantifiable criteria. This is the stage where teams are mobilized; an initial assessment is performed; and the institution's managers review the business case and ask, "Do we really want to do this?" Some may question the need for Phase I: "If everyone knows that the process is broken, why not skip Phase I and just fix it?" Phase I, however, is critical and provides important benefits such as:

- Defines all core processes. This ensures that the institution understands how its myriad activities combine to form 8–10 major institutionwide processes and prevents the mistake of listing hundreds of problems to be addressed. The definition and examples of core processes are discussed later in this section.
- Aligns core processes along a value chain. As described in this chapter, a value chain analysis helps the institution determine the relative significance of each core process to its strategic goals and helps prioritize and focus the redesign effort.
- Assesses the degree to which current technology is used to support core processes. Breakthrough improvement is achieved through the application of technology. During Phase I, team members should assess the current use of technology and its current effectiveness. Typically, technology has been used to simply automate current processes and has not eliminated work. The technological assessment provides an institutionwide view of technology. It changes the focus of technology from a functional view to a process view and serves as critical input to the redesign effort undertaken in Phase II.
- Obtains critical customer feedback. In addition to providing quantitative information on cost, quality, and timeliness, customer data can help inform overall institutional strategy. Not all processes should be redesigned. Some may function well as currently configured. Some should simply be eliminated. Learning whether customers deem the process output to be critical, essential, or optional may change institutional strategy. Any changes in administrative direction should be based on customer preferences and priorities.
- Documents the need for change. Rather than relying on gut instinct, the results of Phase I provide a compelling, data-driven argument for change that can instill confidence in BPR and help dispel concerns raised by skeptics.
- Quantifies the goals for BPR teams. The external trends set forth in chapter I suggest that higher education must accomplish more than reshuffling the boxes on the organizational chart. Documentable, achievable improvement targets must be set for the initiative so that it is credible. The high-level data generated in Phase I focus the efforts of Phase II, ensuring accountability.

These benefits stem directly from four major tasks that comprise Phase I. As presented in exhibit 2, the tasks are structured and methodical so that each major task accomplishes specific objectives.

Task I.1 Mobilize BPR Effort: Establish overall BPR objectives, organize the BPR team, identify change management issues, and define and prioritize processes to be improved.

Task I.2 Conduct Quick Look Assessment: Collect sufficient high-level data (on costs, quality, customers, and technology) to make an informed, data-driven choice as to which processes(es) to redesign in Phase II; understand the current internal and external environments.

Task I.3 Select BPR Process: Select initial processes for redesign, indicate the sequence in which other processes will be redesigned, estimate improvement targets, and create a workplan for Phase II.

Task I.4 Obtain Commitment: Engage the senior management team and begin to develop the architecture for a change in management strategy.

These tasks are deceptively simple in concept, but rigorous in application.

Task I.1 Mobilize BPR Effort

I.1.1 Set Vision and BPR Objectives: Senior administration members, even before formally launching BPR, need to address two fundamental questions: "Why should we do BPR—what are the

Exhibit 2.
BPR for Higher Education — Phase I Tasks

The tasks of *Phase I — Discover* include the following activities:

Task I.1 Mobilize BPR Effort

I.1.1 Set Vision and BPR Objectives

- Recognize the challenge
- Forge new administrative vision
- Establish BPR objectives

I.1.2 Organize for Success

- Confirm leadership
- Establish ESC
- Establish CRT
- Define roles

I.1.3 Set Agenda for Change Management

- Assess scope of change management effort
- Define team members workplan roles

I.1.4 Define and Prioritize Core Process for Quick Look Assessment (QLA)

- Define core processes
- Prioritize for Phase I assessment
- Create draft Master Plan

Task I.2 Conduct Quick Look Assessment

I.2.1 Create Level I Process Baseline

- Complete process maps
- Collect operational and performance data
- Obtain customer input

I.2.2 Create Technology Baseline

Understand:

- Existing technology
- Data and information availability
- Support services for technology
- Future plans

I.2.3 Create Change Management Baseline

- Plan communications
- Plan for human resources changes
- Assess obstacles to change

Task I.3 Select BPR Process

I.3.1 Compare and Categorize Processes

- Evaluate opportunities
- Ensure customer's perspective
- Categorize as BPR, TQM, or stable

I.3.2 Create BPR Master Plan and Phase II WorkPlan

- Prioritize and quantify short term opportunities
- Determine timing for BPR on all processes
- Develop cost/benefit analyses
- Develop draft workplan

I.3.3 Create Change Management Plan

- Develop plan for institutional infrastructure change

Task I.4 Obtain Commitment

I.4.1 Executive Presentation

- Present summary of process findings
- Present costs/benefits
- Describe continuation of work
- Secure commitment

goals?" and "How will we know we've succeeded?"

As discussed in chapter I, higher education now faces unrelenting challenges. BPR does offer a structured, proven method to address these challenges, but senior leaders must identify specifically the particular challenges their institutions face and those they want BPR to address. Identifying the challenges, and thus admitting that a problem exists, is only half the answer to the first question. The remainder comes from developing consensus on how the future administration should operate—an "administrative vision" of sorts. The development of an administrative vision potentially will have broad consequences for an institution. In most institutions, administrative work is typically viewed as the domain of central offices. However, when administrative work is viewed as a process, more than 75 percent of the personnel costs associated with the process lie outside the realm of central administration. It is important to "negotiate" upfront how the cost savings identified through BPR will be distributed. Will the deans' offices lose staff, but retain dollars? Will cost savings be collected centrally and reallocated to support critical academic programs based on the institution's broad plans for the future? Failure to resolve such issues may result in some schools or departments being viewed as "losers" or "winners" based on the nature of the wealth distribution.

In addition, the administrative vision must consider questions related to organizational values. It is at this juncture that managers ask themselves: Who are our customers and how will we treat them? What standards will we use to establish performance goals? Against whom will we compare ourselves? How will we work—as departments or cross-functional teams? How, in a broad sense, will we reward performance? These are examples of the questions that should frame a "vision" for an administrative improvement effort. These seemingly simple questions have tremendous consequences and will require substantial debate among senior leadership. The vision does not have to be written in stone to begin BPR; however, the basic principles and the issues under debate should be understood among the managers of the institution.

Once the vision begins to coalesce, more specific goals will surface, forming the basis for overall BPR objectives and thus answering the second fundamental question "How will we know we've succeeded?" Though initial objectives may be somewhat unfocused (they will become increasingly focused as the project progresses), they nonetheless should address:

- **Scope:** Processes or areas that are potential candidates for BPR.
- **Change management issues:** Initial assessment of the impact of the effort (communication needs; areas that will be affected; level of risk; policy issues that may need to be addressed; potential organizational issues; and human resource issues including redeployment, training, changing nature of work, compensation, reclassification, and resistance).
- **Resources:** Number of employees and funding levels that can be committed to the project.
- **Timeframe:** Timetable that establishes when senior management expects to review major deliverables.

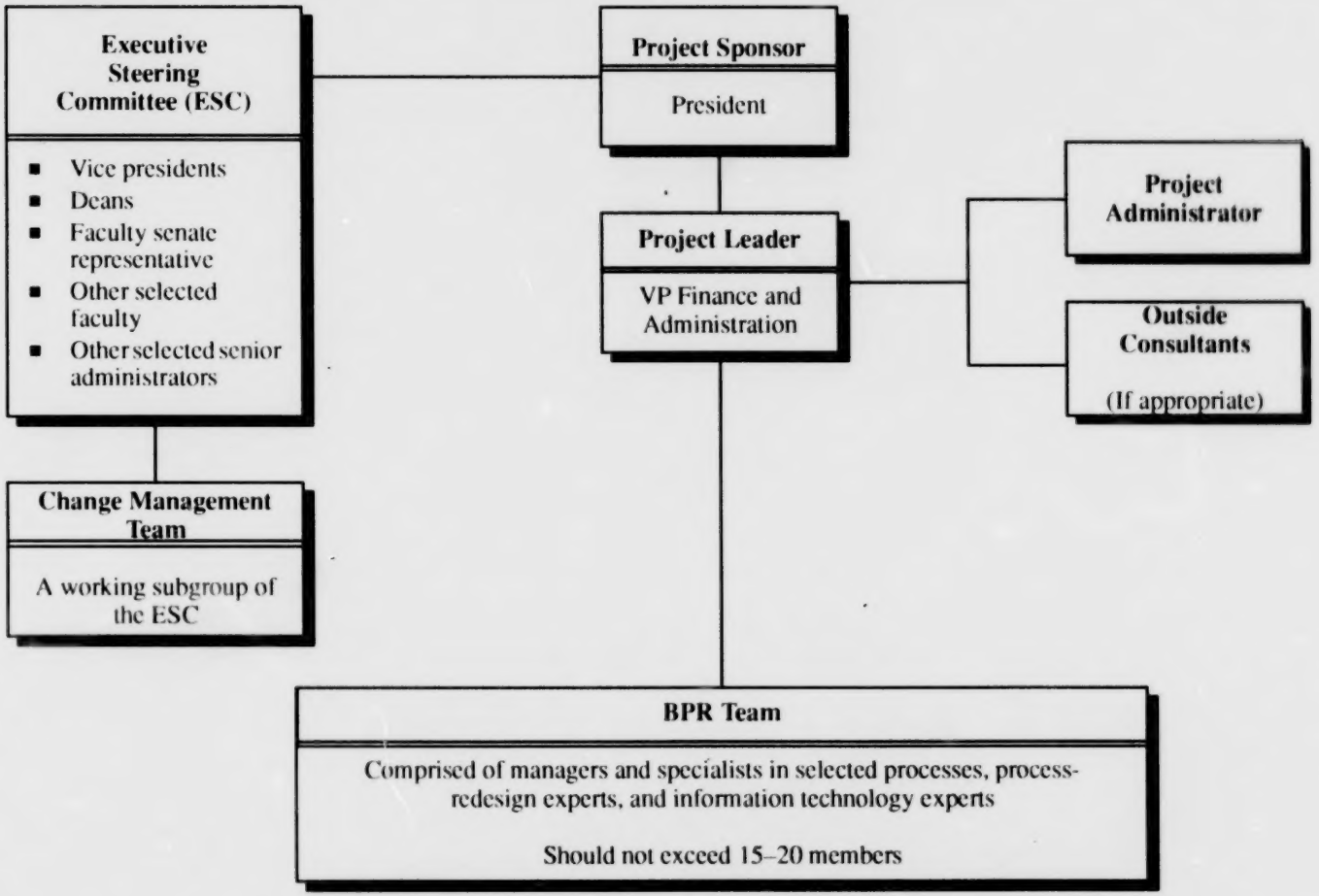
The objectives should *not* include specific anticipated cost savings or detailed project schedules; these estimates will be developed through quantitative study and will be part of the results of Phase I.

Presumably the need for radical change has been identified by the senior management team. Usually, however, individual expectations and perspectives vary greatly. Therefore, establishing both the vision and the formal objectives in writing is important to ensure widespread understanding. These written objectives are the criteria by which the success of the effort ultimately will be evaluated.

A consensus should be developed through a series of facilitated discussions with the entire senior management team. Tactics to achieve consensus likely will vary by institution, but sponsors of the project should ensure that all concerns and doubts are put on the table, that participants engage in candid and rigorous dialogue to clarify the issues, and that strong management action is taken to address these issues. Once consensus is developed and objectives are defined, these objectives will need to be confirmed or enhanced with the team members assigned to staff the BPR project in order to ensure similar understandings and vision.

I.1.2 Organize for Success: As part of launching BPR, the institution formally organizes and staffs the effort. The organizational chart in exhibit 3 is an effective model for higher education, where

Exhibit 3.
BPR Phase I. Discover Organization and Staffing



"shared governance" drives any comprehensive change initiative. However, each institution needs to adjust this model depending on the size and scope of its own BPR effort. The suggested roles and responsibilities for each member of the BPR effort are summarized in exhibit 4. Keys to success in organizing for BPR are:

- **Sponsorship**—Form an executive steering committee (ESC) of administrative and academic managers from major areas of the institution. These leaders will be pivotal in building broad support and actually implementing change.
- **Change Agent**—Ensure the project leader of BPR is the "person who has enough authority over all stakeholders in the processes that will undergo re-engineering to ensure that re-engineering can happen."[3]

  This person is designated as the change agent and is held accountable for making BPR successful. If the focus of BPR is on administrative and support services, the change agent may be the vice president for finance and administration (or a similar position). Depending on the focus of the effort, other change agents may include an academic vice president/provost or a vice president for student services. The cross-functional nature of core processes suggests that whoever is designated project leader must have the full support of the president and director of human resources.
- **Change Management Team (CMT)**—This subcommittee of the ESC should be formed to proactively manage the impact of BPR. As a subcommittee of the ESC, this team should consist of senior managers throughout administrative and academic areas, rather than analysts and staff. The charge to the CMT is broad and consists of three components. One is the "soft side" of change, such as handling employees' expectations, obtaining their "buy-in," or support, of the change, and managing their feelings about the nature of the change. In addition to developing strategies to address employees' emotional response to BPR, the CMT will likely need to change aspects of the organization's infrastructure. BPR teams will design new processes that will require that employees change their behavior or be reassigned to a new area. To accomplish this change in behavior, organizational infrastructure may need to be revised in areas such as job descriptions and responsibilities, performance measures, performance evaluations, job classification and compensation systems, redeployment programs, and training. Finally, some positions will be eliminated as a result of BPR. The CMT is charged with developing outplacement strategies.
- **BPR Teams**—Put the "best and brightest" analysts and staff throughout the college or university on the BPR team in phase 1 and on the process teams in subsequent phases. Staff members selected for BPR teams should:
  - have good analytical skills, the ability to visualize "the big picture," good communication skills, political savvy, credibility, and an appetite for change. Staff should not be assigned to BPR simply because they happen to be available at the time; and
  - expect to commit 50 to 70 percent (or even 100 percent) of their time to BPR and be able to reallocate most of their current responsibilities. While some institutions may balk at the notion of releasing staff time to spend on the redesign project, failure to do so will slow the effort, make "buy-in" difficult to achieve, and ultimately reduce the likelihood that real change will occur. Staff members who are intimately involved in diagnosing the problems in the current process and identifying solutions will be eager to implement the new process. They will institute changes along the way and will be impatient for long-term changes to occur. Even if the effort is led by consultants, staff must be engaged throughout the process to ensure that the redesign is fully implemented.

Of the four keys to success in organizing for BPR (ESC, change agent, change management team, and best and brightest), top management (the ESC) commitment to change is the most essential. Without this dedication, BPR will not work. In all organizations, examples of failed initiatives abound. Frequently the "root cause" of failure is the lack of senior management commitment. To

3. Hammer, Michael and James Champy, *Reengineering the Corporation: A Manifesto for Business Revolution*, New York: Harper Business, 1993, p. 104.

Exhibit 4.
Overall Roles and Responsibilities for Phase I

Who	Roles/Responsibilities
Project Sponsor and Executive Steering Committee	■ Be held accountable for results and vision ■ Break down barriers to change ■ Communicate continually their commitment to change ■ Champion the redesign efforts ■ Set strategic direction for the campus and link it to the redesign effort ■ Provide resources for redesign ■ Set vision and stretch goals for BPR ■ After implementation, review key process performance indicators on a regular basis with process owners
Project Leader and Project Administrator	■ Select all BPR team participants and locate resources ■ Maintain and update project schedule, calendar, and logistics ■ Provide project infrastructure (notebooks, training materials, written work products, etc.) ■ Provide linkage among all redesign efforts ■ Track and report progress of project to Executive Steering Committee ■ Resolve project issues ■ Empower BPR team members
Change Management Team (working subgroup of Executive Steering Committee)	■ Ensure that the university's infrastructure (human resources policies, communication plans, performance measures, incentives, etc.) supports a new work environment ■ Create and implement a comprehensive BPR communications plan ■ Address policy issues as raised by the CRT
BPR Team	■ Champion the BPR redesign effort; serve as ambassadors to departments ■ Research and study BPR efforts in other industries ■ Identify potential processes for redesign ■ Provide knowledge and ideas ■ Create and/or tailor data collection forms ■ Collect Quick Look Assessment data ■ Conduct all interviews and focus group sessions ■ Create written work results ■ Create the business case for change ■ Select and recommend processes for redesign in Phase II ■ Become process team members in Phase II

avoid this mistake, ESC roles and responsibilities must be thoroughly understood and adopted by all management team members. The support of ESC members must be continuously and visibly communicated across the campus. Members must do more than pay lip service to the project—they must act so that their actions support their words. This role cannot be delegated. Members of the ESC should take every opportunity to meet with customers, to understand employees' fears, and to encourage those who are on board to continue their good work.

In addition to stressing the importance of the project, the organization and staffing structure in exhibit 3 ensures the participation of key, influential decision makers. The recommendations stemming from BPR will assuredly affect the operations of many departments, regardless of their organizational placement within the institution. It is only through this cross-functional participation in all aspects of BPR and through top management sponsorship that politically sensitive changes can be implemented and dramatic improvement can be achieved.

I.1.3 Set Agenda for Change Management: Making change manageable is one of the goals of BPR. Part of achieving this goal is understanding the impact of change and then undertaking actions to address each aspect of the change. In this task, the CMT begins its effort to manage employee expectations (develop a communications plan) as well as identify the potential human resource areas that may need to be altered to support the efforts of the redesign teams (identify infrastructure and cultural barriers to change). Finally, not all employees will remain after the process is redesigned; some may lose their jobs. The CMT must devise strategies—early on—to assist these employees.

In developing the communication plan, the CMT should review the overall BPR workplan to anticipate when and where communication is needed. For each critical junction in the process, the team should identify the objective of the communication, the message, the audience(s), and the methods by which the message will be communicated. As a guiding principle, the team should recognize that it will be *impossible* to "overcommunicate." Rather, team members should be encouraged to communicate frequently and honestly, even if the message is simply a report outlining the status of the project. If a communication vacuum develops, it will almost surely doom the BPR effort; significant time and energy will be required to repair the damage. In the absence of concrete information, employees will draw their own conclusions based on the wrong sources. To avert the tendency for drawing erroneous conclusions, the communication effort should be staged so that news is regularly forthcoming.

The CMT should also begin to anticipate areas in which organizational infrastructure must change to implement the redesigned processes. To accomplish this, the team should begin by speculating about the nature of the change. Although each institution will be uniquely challenged by BPR, BPR efforts at other industries and institutions can serve as models showing how the shift to a process orientation affects the nature of work, reporting relationships, and organizational structures.

One mechanism to facilitate such discussion is the list of "change areas" found in exhibit 5. Using this list, the CMT can employ the following "force-field analysis" to assess the human resource policies and culture that may help or hinder the implementation of BPR. Members of the team may be asked to spend 15 minutes to review the list and jot down their opinions regarding the ways in which their current policies and culture may be "forces for" or "forces against" the administrative changes commonly resulting from BPR. These opinions can then be posted on flip charts with "forces for" on one chart and "forces against" on another. The team then clusters these opinions into similar groups. The result will be a summary list of the issues like those presented in exhibit 6.

Based on the force-field analysis, the CMT begins to define its agenda for the next few months and assign specific responsibilities and tasks to team members. In particular, the team should develop strategies to collect data to strengthen its initial "intuitive" assessment.

I.1.4 Define and Prioritize Core Processes for Quick Look Assessment: Once senior management addresses the broader issues, the BPR team is ready to begin work. The first activity of the team is to define all core processes of the institution's administration. This list is usually generated as part of a facilitated team meeting, utilizing brainstorming and consensus-building techniques. Earlier, the term "process" was described in conceptual terms. For the purposes of defining and prioritizing core

Exhibit 5.
BPR Affects All Aspects of the Institution's Administration

Change Areas	From . . .	To . . .
■ Work units change	■ from functional departments	■ to process teams
■ Jobs change	■ from simple tasks	■ to multi-dimensional work, analysis, and problem-solving
■ Peoples' roles change	■ from controlled	■ to empowered
■ Job preparation changes	■ from task-specific training	■ to education and decision-making skills
■ Focus of performance measures and compensation shifts	■ from individual performance and simple task completion	■ to team and overall process results
■ Advancement criteria change	■ from performance in current position	■ to ability to produce results in the next position
■ Values change	■ from protective	■ to productive
■ Managers change	■ from supervisors	■ to coaches
■ Executives change	■ from scorekeepers	■ to leaders

Source: Hammer, Michael and Champy, James Reengineering the Corporation: A Manifesto for Business Revolution, New York: Harper Business, 1993, pp. 56–82.

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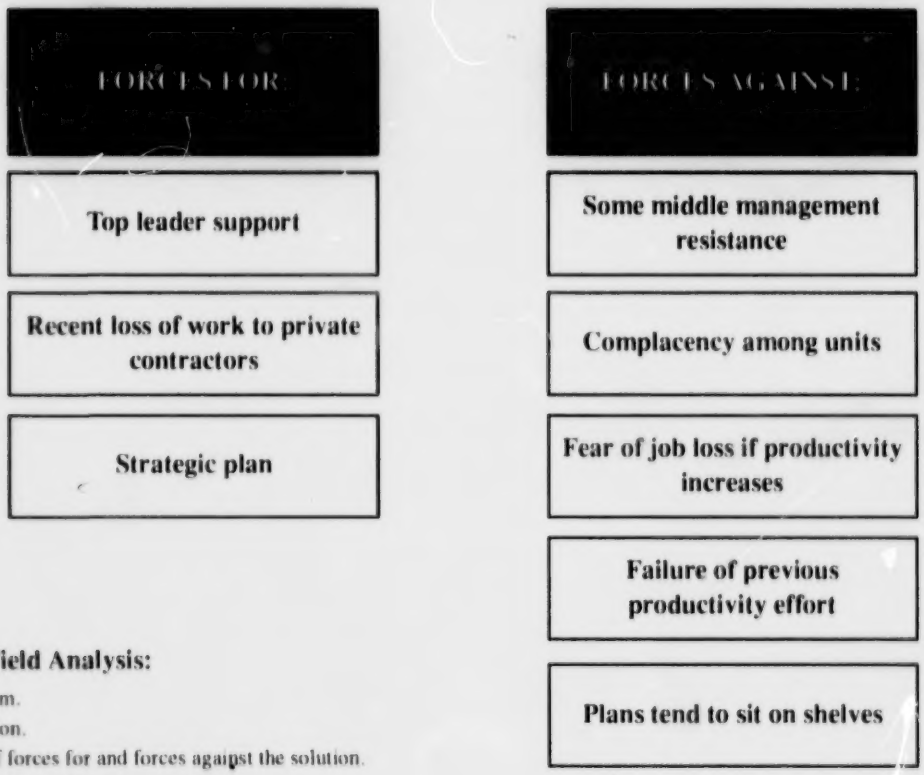
Exhibit 6.
Force-Field Analysis


FORCES FOR
Top leader support
Recent loss of work to private contractors
Strategic plan
FORCES AGAINST
Some middle management resistance
Complacency among units
Fear of job loss if productivity increases
Failure of previous productivity effort
Plans tend to sit on shelves

To Conduct a Force-Field Analysis:

1) Describe the issue/problem.
2) Develop an "ideal" solution.
3) Brainstorm to get a list of forces for and forces against the solution.
4) Rank the forces in order of their importance or effect.
5) Develop change management strategy for removing the most important forces against and for reinforcing the forces for.

Source: Carr, et al. *BreakPoint Business Process Redesign* in the Coopers & Lybrand Performance Solution Series (Arlington, VA: Coopers & Lybrand, 1992), p. 107

"business" processes, the authors rely on a more technical description: a core business process is a series of linked activities that add value to an input to create a service or product for a customer. Notice this definition focuses on action, value, inputs, outputs (product or service), and customers. Additionally, look for a *core* process to possess the attributes listed below:

- A core process is composed of a series of subprocesses (i.e., it is complex)
- Subprocess inputs are typically the outputs of a previous step in the process
- Every activity must add value to the process (from the customer's perspective, it is important for that activity to be performed)
- Core processes cross functional lines
- Every core process has a supplier and an "external" customer, that is, outside the administration
- A complex process will also possess internal supplier/customer relationships (within the administration, such as another department)
- The most important criteria in defining process performance are the customers' requirements
- The importance of the final "key" output of any

process is based on customers' needs and requirements

The above definition and the attributes help focus the BPR team on the broad, core processes—the ones that cut across several departments and constitute the bulk of the work in the administration. These definitions help reduce the "noise" of extraneous subprocesses or even small activities that may be "broken" but which do not require the comprehensive focus of BPR to repair.

To better understand how an institution's core processes converge to create value, the BPR team should be challenged to align its comprehensive list of core processes along a value chain. Applying Michael Porter's concept of a value chain to higher education, the BPR team will aggregate its list of processes in a way that ignores traditional reporting relationships and functional-based orientation.[4] Depending on the institution, a partial list of processes may include:

- Core Academics
  - Generate Knowledge
  - Transmit Knowledge
- Academic Support
  - Acquire grants
  - Manage grants and contracts
  - Promote and tenure faculty
- Student Support
  - Create and manage student learning and living environment
  - Enroll students (including admit, matriculate, register, record, and graduate students)
- Indirect Support
  - Acquire goods (including requisition, order, receive, pay for, and inventory goods)
  - Manage facilities
  - Record and report financial transactions
  - Provide technical resources and infrastructure
- Auxiliary Support
  - Provide food services
  - Provide bookstore merchandise

Once the universe of core business processes is defined, the list of processes for the quick look assessment (in Task I.2) is prioritized by identifying those processes that are the most "likely candidates" for a redesign effort. To initially select the likely candidates, use the following rough criteria.

The process should:

- have a high number of transactions annually (thousands per year);
- be of high cost to the institution to deliver (in terms of staff time and costs);
- be of high importance to customers; and
- have low customer satisfaction.

At this early stage of evaluation, BPR members should simply use gut intuition to assess processes against these criteria. As shown in the example in exhibit 7, some processes will have a high number of transactions each year, be resource intensive, be very important to customers, and have low customer satisfaction. These processes will be assessed in the next task (I.2) in the quick look assessment. Obviously, many processes will not readily meet these criteria. While still important, they are not candidates for the *first* BPR initiative. Instead, these processes should be planned for BPR in the future, or they may be candidates for TQM, which will provide for slower, more incremental improvements, rather than radical change.

Thus, at the end of Task I.1, the team actually has generated two lists of processes: those for review in the Phase I quick look assessment and those that will receive a quick look at a later date. Based on these two lists, the BPR team should begin to draft the BPR master plan, a sample of which is shown in exhibit 8. The BPR master plan serves as a planning and communication tool for ongoing BPR efforts. The plan shows that a small group of processes will be evaluated immediately in Phase I, and an even smaller number will be selected for redesign in Phase II. Furthermore, those processes not selected for immediate evaluation in Phase I will eventually be analyzed and potentially redesigned. The point is that BPR is not a one-time, static event addressing one or just a few processes. The phases of BPR become an ongoing process for an institution—a new way of approaching the management of the institution's "business." This initial framework for the BPR master plan is the final output of Task I.1.

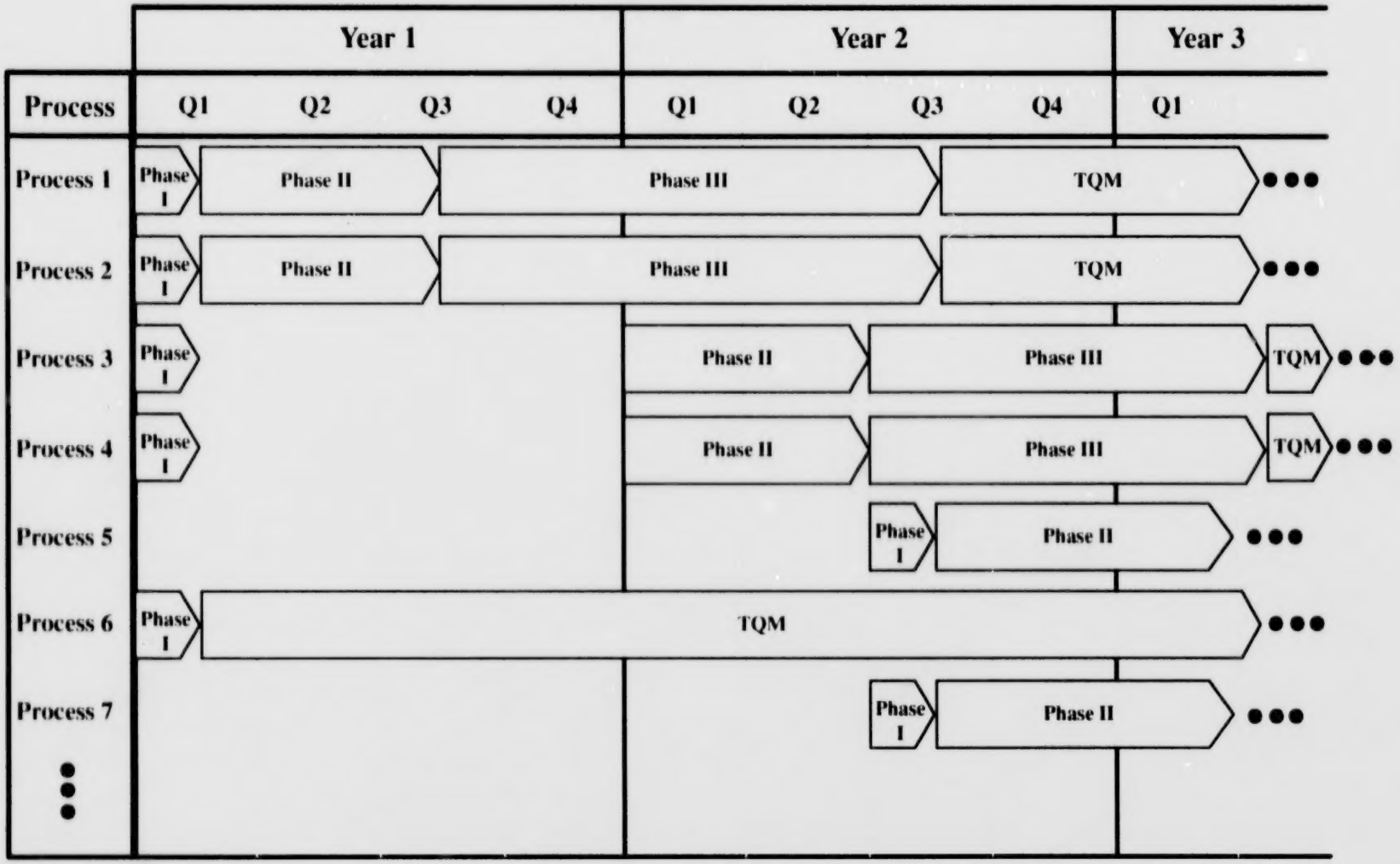
At the end of Task I.1, the beginning of a new administrative vision is established, the institution's BPR organizational structure is created with

4. Michael E. Porter, *Competitive Advantage: Creating and Sustaining Superior Performance*, New York: The Free Press of Macmillan, Inc., 1985, pp. 31–61.

Exhibit 7.
Identify Core Processes Rate and Select Processes for Evaluation in Phase I

Process	Annual Transaction Volume	Resource Costs	Customer Satisfaction	Customer Importance
Acquire goods	High	High	Low	High
Develop budget	High	Medium	Low	High
Record financial transactions	Very High	High	Low	High
Manage facilities	Medium	High	Low	Medium
Hire employees/manage records	High	High	Low	High
Enroll students/manage records	High	Medium	OK	High
Plan and execute curriculum	Low	Low	OK	High
Manage contracts and grants	Medium	Medium	OK	High
Request and acknowledge gifts	Low	Low	Unknown	Unknown

Exhibit 8.
Example of a BPR Master Plan



specific roles and responsibilities, the scope and team members for the change management effort are established, the core processes are identified, processes are prioritized for the quick look assessment, and the initial components of the BPR master plan are complete.

Task I.2 Conduct Quick Look Assessment (QLA)

Task I.1 sets the framework for Phase I as well as the whole BPR initiative. The effort now has a foundation on which to build the tangible attributes of Phase I. If one uses the analogy of a building, Task I.2 fleshes out the girders with hard data and lots of customer input. Three major activities focus on three different types of data, all of which help identify the process(es) that should be redesigned in Phase II. The three major activities of Task I.2 are called "baselines" because they focus on the "as-is" process and provide base measurements where a line can be drawn and against which future improvements can be tracked. The three baselines—process, technology, and change management—are described in detail below.

I.2.1 Create "Level I" Process Baseline: The objectives of the "process baseline" are to:

- quantify basic, high-level information about each process within a short timeframe,
- support selection of a process for redesign in Phase II,
- complete the BPR master plan,
- create the Phase II workplan, and
- develop a business case to justify change.

The term "Level I" is used to distinguish between the process baseline created in Phase I and the one created in Phase II. The Level I process baseline is higher level and developed in a much shorter timeframe than the Level II baseline created in Phase II. At a minimum to complete the Level I process baseline, the BPR members should complete process maps, obtain customer input, and collect other operational or performance measurements. These data are collected using a combination of the tools briefly defined below and explained in detail in the next chapter.

Value-Added/Non-Value-Added (VA/NVA) Analysis: Distinguishes between those activities that are truly essential from the customer's perspective (i.e., have value) and those that are not essential to the customer and should be minimized over time. Helps analysts reduce complexity in a process and redesign a process to focus on what is really important to customers. Used with work distribution chart (WDC) analysis or process flowchart analysis.

Work Distribution Chart (WDC) Analysis: Describes the staff time and costs expended on activities within a department or a process. Helps prioritize areas for improvement.

Process Flowchart Analysis: Creates a step-by-step diagram of how work is done in a particular process; tracks a wealth of data about that process, such as costs, time, delays, and errors. Helps analysts develop many redesign ideas and provides a basis against which improvements can be measured.

Cost of Quality (COQ) Analysis: Categorizes and quantifies the cost of various types of non-value-added activities. Is helpful in designing new approaches to ensure high quality in processes and in more accurately estimating potential savings. Is used with WDC analysis or process flowchart analysis.

Volume Analysis: Evaluates the different types and numbers of transactions that flow through a process and affect employee workload. Helps analysts determine three aspects of redesign: determining types of special handling for transactions, appropriate approval requirements, and reasonability of employee workload.

Benchmarking: Compares the performance of one process to that of other processes within the same institution, other institutions, or even other companies outside higher education. This is one of the best ways to generate new ideas for process redesign and to prove the need for change.

Customer Analysis: Measures current customer satisfaction, identifies key areas for improvement, and identifies potential future customer needs.

The BPR team applies these tools with a high-level view of the process in conjunction with other data-collection techniques, such as individual interviews and focus groups, to assess customer satisfaction and solicit ideas for improvement. By

applying these tools, the BPR team will assess the costs of each process, potential savings, how work is done, level of technology in use, customer satisfaction, quality, bottlenecks, comparative performance, and the volume of transactions processed. The BPR team will need to package the results of its analyses of each process so that the processes can be compared against each other and so people not involved with BPR can easily understand and evaluate each process' performance. The package of information for each process should:

- provide descriptive data about the process,
- highlight the major findings and conclusions regarding that process,
- present the process map, and
- summarize the expected impact of—and readiness for change in—each process, including a high-level cost-benefit analysis.

The packages of process information, or "process baselines," are the output of this activity.

I.2.2 Create Technology Baseline: As part of the high-level QLA, the BPR team also needs to understand the existing technology. Through interviews and/or surveys, the team should develop:

- a one-page diagram of the logical architecture of existing information technology applications;
- assessment of the degree to which the campus is networked and of future strategies for voice, data, and video networking;
- a list of software and hardware currently in use in the central computing organization as well as central and departmental offices supporting business processes;
- a list of applications that support existing processes;
- assessment of quality, accuracy, and availability of applications data;
- assessment of quality, accuracy, and availability of applications documentation;
- assessment of strategy and plans for future enhancements or replacement of existing systems; and
- assessment of current skills, services, and number of employees in the campuswide technology (central and local) support organization.

This type of information will establish the institution's technological environment and will help to identify the level of technological investment, training, and redeployment that may be required to implement the redesigned process. Again, this information will need to be packaged in a format that is easily understood and that highlights the important information for those not intimately involved in BPR.

I.2.3 Create Change Management Baseline: The results of the initial evaluation of the change management team (CMT) need to be fleshed out and confirmed. This task collects information regarding the organizational culture, and provides data for the CMT's action plans. Using the list of "forces for" and "forces against" developed earlier, the team should assess the organization's norms and values and attempt to codify barriers presented by current job descriptions, classification systems, or reporting relationships by assessing the following:

- Degree of cross-functional cooperation
- Level of freedom employees have to implement suggestions
- Amount of teamwork routinely undertaken and rewarded
- Latitude to make suggestions to improve a process
- Existence of explicit criteria for promotion
- Typical communication flow
- Ability of staff to bypass next in command to get things done
- Amount of access to decision information
- Openness to change

Documenting and codifying the current culture can be accomplished by several methods, including focus groups, interviews, or surveys. Once as-is organizational behaviors are identified, they can be mapped against desired "to-be" behaviors, and strategies can be developed to help alter the culture.

At the end of Task I.2, the team should have completed all process data collection, begun data analysis, completed an assessment of existing technology versus potential future technology needs, and identified the major change management issues that will be critical for the BPR effort at the institution.

Task I.3 Select BPR Process

Now that the facts and data are in place, Task I.3 demands critical thinking and decision making.

In the first major activity of this task, the data collected in Task I.2 supports the selection of processes(es) for redesign. The remaining two activities result in project plans to address the many aspects of BPR in Phase II.

I.3.1 Compare and Categorize Processes: Using the qualitative and quantitative data gathered in Task I.2, teams will identify which processes are the best candidates for BPR. At this time, teams look for processes that can achieve huge leaps of improvement rather than incremental, slow and steady improvements. Processes improved through BPR should rise to a whole new level of performance—breaking away from past constraints and assumptions. Thus, the best candidates will offer the "breakpoints," or opportunities for dramatic, rapid improvements. As Carr, et al. indicate in their book *Breakpoint BPR*, each institution will identify its own, unique breakpoint opportunities by answering the two questions below:

- What do our customers value most?
- How can we achieve and sustain breakpoint performance?

The first question leads teams to consider customer expectations. Do current service levels meet customer expectations? Has the institution met and exceeded customer needs? The larger the gap between customer expectations and the performance of the process, the stronger the candidate is for BPR.

The second question leads teams to analyze process performance against industry benchmarks and best practices. Benchmark analysis quickly separates the low performers from the higher performers. Comparisons may indicate that another institution provides the same service in a fraction of the time or for less cost. Teams may initially speculate that their process costs are high due to higher quality output. But follow-up analysis may indicate that the service level at the best-in-class institution is actually of a very high quality, thus dispelling the myth that process costs are high because the quality is higher.

Differences in performance identified by these two analyses indicate the extent to which a dramatic improvement can be achieved. As the teams wrestle with these two questions, they should also consider the criteria presented in exhibit 9. These criteria round out the analysis and allow the team to consider such variables as time required to redesign, probability of success, visibility, and other factors. The selection process should result in defining processes as:

- **BPR-Rich:** The process should be completely redesigned from scratch, using technology to radically improve the process.
- **TQM Potential:** Existing process is sound but can be improved through TQM techniques, which will offer incremental, but still valuable, results.
- **Stable:** Process does not require significant, focused improvement efforts in the near term.

Two factors are especially important in selecting the initial set of processes to be redesigned and in creating the master plan for redesign. First, because the initial effort must prove the worth of the methodology, the first project must be particularly compelling. It should satisfy all the criteria in exhibit 9 and also should have the potential for cost savings/revenue enhancements. Second, the scope of the process must be defined broadly enough so that it encompasses the entire process. Although all the workflow of a process may not be changed, it must all be included within the scope of the BPR project. Significant cost savings and breakthrough improvement in higher education will be achieved only by addressing the cross-functional redundancies and inefficiencies that have evolved over time in so many institutions.

I.3.2 Complete BPR Master Plan and Phase II Workplan: The purpose of this task is to plan the next steps for BPR and prepare for presentation to the executive steering committee. The BPR team and the change management team together develop these two plans.

Once specific process(es) are selected for redesign in Phase II, the BPR team and CMT estimate the duration of Phases II and III for each of these processes and should estimate when those processes *not* selected for immediate redesign may be redesigned in the future, if at all. Exhibit 8, presented earlier, is a generic example of what a timeline might look like for a BPR master plan.

The initial Phase II workplan is then developed for the selected processes and should include:

- estimated project budget;
- high-level project schedule;

Exhibit 9.
Selection Criteria for Process(es) to be Redesigned in Phase II

Criteria	Definition
Significant opportunity for improvement	Offers potential for major process improvement in terms of quality, timeliness, service enhancements, and cost savings.
Visible impact in the university community	Results of the project will be highly visible to students, faculty, administrators, or external university "customers."
High opportunity to use information technology as an enabler	Application of technology offers significant enhancement of potential BPR gains.
Measurability of process and results	Results of process improvement can be clearly measured with objective criteria.
High, positive impact on culture	The BPR pilot will positively impact departmental and administrative culture.
High, cross-functional interaction	BPR pilot offers opportunities for joint interdepartmental problem-solving and interaction.
Reasonable time to reengineer	Demonstrable results within six months; reasonableness of scope.
High probability of success	Pilot has high likelihood of demonstrable success within the time specified. High degree of commitment from the "Process Owner."

- staff resource requirements;
- cost-benefit analyses; and
- interaction among projects, if the team is re-engineering more than one process.

This initial plan for Phase II should give the ESC a good indication of the scope and level of effort involved, as well as basic workplans. Additional detail will be added to this high-level plan at the beginning of Phase II to utilize the plan as a true project management tool.

1.3.3 Create Change Management Plan: Based upon the change management baseline, the change management team should finalize its plans to address human resource issues. Possible areas to be included are:

- personnel policies;
- performance measures;
- redeployment plans;
- severance plans;
- collective bargaining agreements;
- communication plans;
- training/awareness meetings;
- expectations for senior managers in the new process environment; and
- roles and expected behaviors of staff, especially managers, in the new environment.

Even as the CMT attempts to be proactive, the team has an important *reactive* role as well. BPR is not a static process, but an iterative one. It will not be possible at the outset to pre-identify all possible issues; it is the responsibility of this group to address problems and barriers throughout the subsequent phases in the BPR process. In addressing these problems and barriers, the CMT will be working with members of each of the process teams in Phase II, as well as with members of the wider institutional community.

Task 1.4 Obtain Commitment

Having completed analyses, selected process(es), and planned Phase II, the BPR team members and CMT are ready to communicate their findings. Selecting the process(es) for re-engineering in Phase II is a crucial decision and requires consensus and confirmation of institutional commitment. In order to legitimize its Phase II efforts, the BPR team must revisit the goals established for the BPR initiative with the ESC, share its results and recommendations, and reaffirm the sponsorship of the executive steering committee. The visible support of these leaders is vital to effectively implementing redesigns in the future, especially if the processes are cross-functional. Furthermore, as these leaders are the champions of change, securing their commitment is part of the ongoing process to achieve acceptance and buy-in to the BPR recommendations.

Usually, this exchange of ideas transpires as part of a retreat or extended meeting. The BPR team presents the appropriate baselines, delving into sufficient detail to support its process selection and to prove the worth of continuing with Phase II. The CMT also describes the as-is organizational climate, presents barriers to change, and gains the support of the ESC to address the issues that will enable the redesigned process to be implemented successfully. In some instances, a thorough discussion of the results on the IT baseline assessment may also be appropriate. This is particularly true if the assessment has found wide gaps between current levels of support and the support that may be required in the high-tech world of today.

The outcome of this task will be a decision to either halt or proceed with the re-engineering effort.The ESC may choose *not* to proceed for any number of reasons: they are not ready for the political battles, the project is too costly, the information technology infrastructure is far worse than expected and needs to be improved before proceeding, etc. If the ESC does delay Phase II, it should clearly identify why and should discuss alternative actions and the necessary criteria before embarking upon Phase II. If the ESC chooses to proceed, it should express a formal commitment to the project scope, schedule, estimated costs, level of effort required, and anticipated results.

Phase II: Redesign—Planning the Breakthrough

In Phase II, the BPR effort expands in many ways, including the number of participants, amount of work, and depth of analysis. The phase begins with careful planning and has the overall goal of producing a redesigned process model and implementation plans addressing technology, human resources, and processes. To accomplish this goal, the phase is divided into five major tasks.

Each task and its corresponding activities are displayed in exhibit 10. The objectives of each task include:

Task II.1 Mobilize: Organize the BPR Phase II team effort, define specific roles, and further develop and confirm workplans.

Task II.2 Analyze "As-Is" Processes: Analyze current processes in detail, understand customer needs and satisfaction, understand best practices from other institutions or industries, and prepare plans to improve the institution's ability to change.

Task II.3 Innovate: Determine the desired attributes of a new process, generate alternatives, select the best option, and identify the specific infrastructure changes needed to support the proposed process.

Task II.4 Engineer: Complete the process redesign, specify technological needs, estimate costs and benefits, and identify action steps to change infrastructure.

Task II.5 Obtain Commitment: Present findings, recommendations, and implications to ESC; commit across all functions to redesign concepts and plan.

The activities that comprise each of these five tasks are explained in detail below.

Task II.1 Mobilize

After obtaining the ESC commitment at the end of Phase I, the project leader may need to modify or confirm project plans as appropriate and will need to organize the BPR team members to prepare for Phase II.

II.1.1 Organize for Success: Continuing into Phase II, the BPR project sponsor, executive steering committee, CMT, project leader, and project administrator fulfill the same roles and responsibilities that were outlined in Phase I. In addition to these continuing roles, exhibit 11 shows that there are a few new roles in the overall BPR effort: process teams, process owners, and an information technology team.

- **Process Teams:** The BPR members from Phase I should be assigned to specific process teams for the Phase II effort. There should be one BPR team (of approximately 6 to 10 people) for each core process that is being redesigned. One team cannot redesign more than one process. Additional staff should also be added to each of the process teams where specific functional, technical, or customer expertise/representation is needed at specific times during Phase II. Smaller institutions may choose to staff process teams at the lower end of the range (i.e., six or seven), but the process team will be hard-pressed to complete its work in a timely fashion with less than six team members.
- **Process Owner:** Each team is headed by a process owner who will ultimately be responsible for managing the redesigned process on a long-term basis and will be held accountable for the results of the BPR team. The process owner is usually one of the managers of the functions through which the process flows. While one manager may become the process owner, he or she will still need to develop the support of the other functional managers. The BPR team members support the process owner in all analyses, report production, interviews, and redesign ideas. In addition, process owners meet weekly with the project leader and team leaders for the change management and information technology (IT) teams to compare notes and to address campuswide issues.
- **IT Team:** Technology is a critical factor in BPR, usually as the enabler of radical process improvements to meet customer needs. Therefore, IT efforts need to be carefully coordinated across teams and throughout the institution. IT team members are usually drawn from the central IT organization and may also include knowledgeable IT analysts from other academic or administrative departments. Selected members of this IT team are also assigned to each of the process teams. These members serve as technology experts to each process team and then report back and work with each other to ensure consistent direction and information across process teams.

The specific roles and responsibilities of the process team members, process owners, and information technology team members are outlined in exhibit 12.

Exhibit 10.
BreakPoint™ BPR for Higher Education — Phase II Tasks

The tasks of *Phase II — Redesign* include the following activities:

Task II.1 Mobilize	Task II.2 Analyze "As-Is" Process(es)	Task II.3 Innovate	Task II.4 Engineer	Task II.5 Commit
II.1.1 Organize ▪ Establish BPR process teams and process Owners ▪ Organize IT team ▪ Define roles	**II.2.1 Create Level II Process Baseline** ▪ Complete detailed maps ▪ Collect additional operational and performance data	**II.3.1 Vision** ▪ Define desired process attributes ▪ Develop new process ideas	**II.4.1 Complete Detailed Process Design** ▪ Detailed flowchart ▪ Process measurements ▪ Staff resources ▪ Critical information	**II.5.1 Executive Presentation** ▪ Understand design, costs, and benefits ▪ Understand recommendations and implications ▪ Understand Phase III action plans ▪ Commit across all functional areas
II.1.2 Plan Project ▪ Enhance workplan with greater detail ▪ Assign specific resources ▪ Review by project leadership	**II.2.2 Obtain Customer Input** ▪ Develop draft systems requirements ▪ Assess customer satisfaction and priorities	**II.3.2 Filter Options** ▪ Simulate alternatives ▪ Strengths, weaknesses ▪ Critical success factors ▪ Barriers to success ▪ Organizational impacts	**II.4.2 Specify Information Systems** ▪ Complete requirements ▪ Issue RFP ▪ Select vendor or decide to custom build	
	II.2.3 Research Best Practices *Collect:* ▪ Performance benchmarks ▪ Process and technology ideas	**II.3.3 Define Desired Change Management Outcomes** ▪ Manage communications ▪ Support BPR teams	**II.4.3 Quantify Costs/ Benefits** ▪ Net present value of all dollar costs and benefits ▪ Describe specific qualitative benefits	
			II.4.4 Specify Change Management Actions ▪ Identify specific infrastructure change ▪ Consider implementation obstacles ▪ Revise commun. plan	

Exhibit 11.
BPR Phase II. Redesign Organization and Staffing for *Multi-Project* BPR Effort

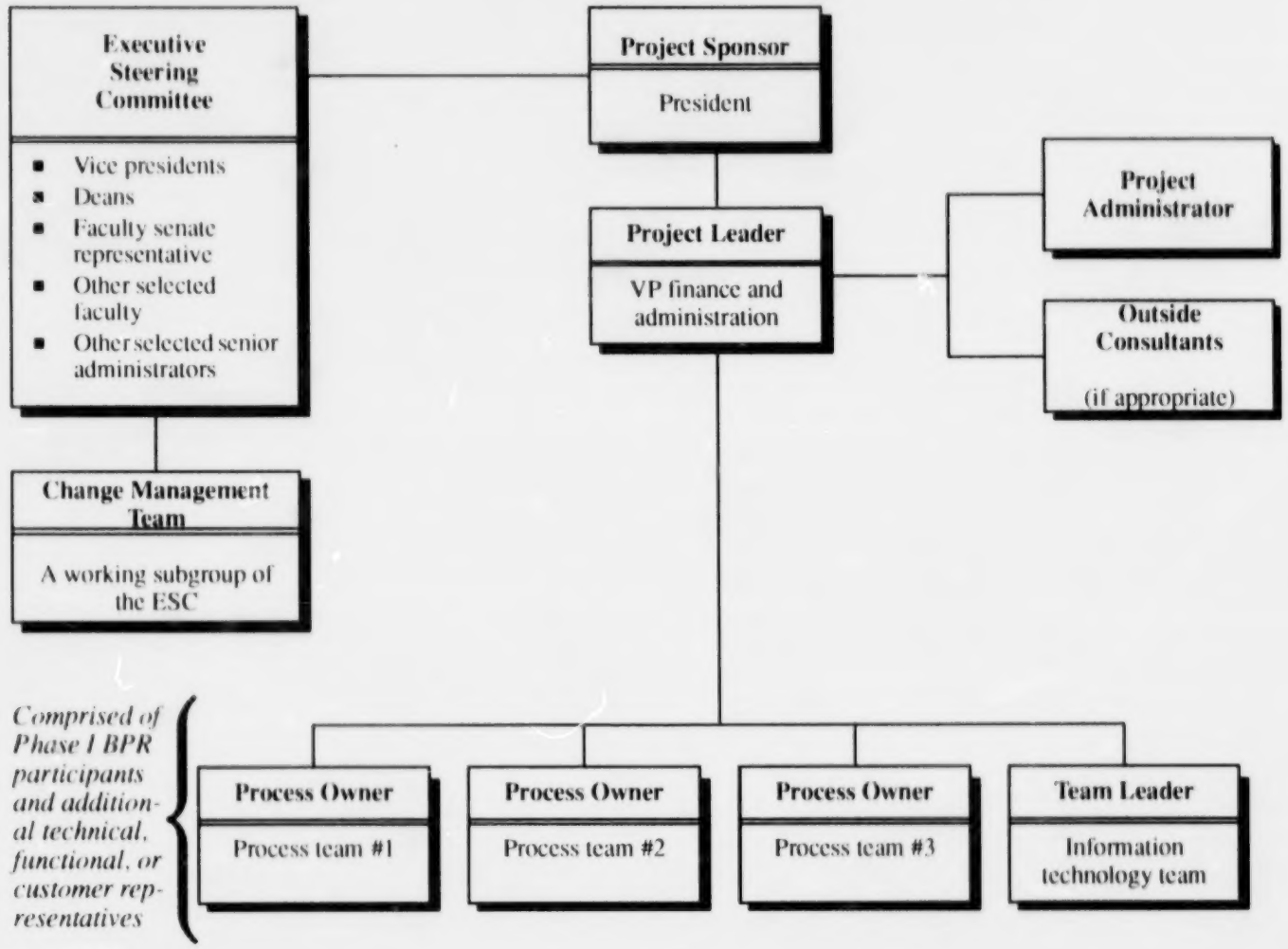


Exhibit 12.
Additional Roles and Responsibilities for Phase II

Who	Roles and Responsibilities
Process Owners	■ Develop project plans and track project progress to plan ■ Manage allocated resources and results ■ Provide recognition to team participants ■ Provide linkage to other redesign efforts ■ Provide knowledge and understanding of existing process ■ Provide an objective view of the process ■ Sponsor and participate in site and vendor visits to understand best practices ■ Participate in the redesign of the process ■ Contribute to organization and job design decisions ■ Own the process; be responsible for changes to the process ■ Be held accountable for process results against continuous improvement goals after BPR is implemented ■ After implementation, report process performance on a regular basis to the Executive Steering Committee
Process Team Members	■ Develop project plans, in conjunction with process owner ■ Create and/or tailor data collection instruments ■ Provide the interface between customers/users and the process redesign ■ Provide knowledge and ideas ■ Report project progress on a weekly basis ■ Participate in the redesign of the process ■ Create written work products ■ Own the outcome ■ Present results and recommendations to ESC
Information Technology Team	■ Provide one representative to each of the process teams ■ Provide technical expertise to process teams ■ Develop the system architecture to support proposed process designs ■ Assist in vendor negotiations ■ Coordinate information technology efforts across the campus

II.1.2 Plan Project: The Phase II workplan originally developed at the end of Phase I needs to be enhanced with more particulars. Specific resource requirements are determined and filled, schedules are established, and detailed plans are reviewed and confirmed by project leaders before analyses begin.

Task II.1 is complete when the teams are organized and the workplan is finalized and understood by all team members. Team members are then ready to begin analysis in the next task.

Task II.2 Analyze As-Is Process(es)

The primary objective of this task is to collect and analyze quantifiable, replicable, detailed measurements of the "as-is" process. Furthermore, many excellent redesign ideas will surface during the analyses and should be recorded for use in the next task. This task has three main activities, which reflect three typical ways of discovering new ideas to improve a process: looking at the processes and problems themselves, talking to customers, and researching how others do similar types of work.

II.2.1 Create Level II Process Baseline: In Phase I, the BPR team developed and analyzed high-level process flowcharts and data to understand the basic components of each overall process and create the case for change. In this phase, the process team(s) develops the baseline as a prelude to designing a new process. As such, the purpose of the Level II baseline demands a more in-depth understanding of the process.

The process team creates detailed process flowcharts, mapping each discrete step in the entire process. The same techniques are used to create the flowcharts that were used in Phase I (see the process flowchart tool in chapter III). The difference is the level of detail. For complex processes, computerized simulation modeling tools can be used to track all activities.

In addition to the process flowcharts, the process team also collects additional detailed, process-specific data to understand the process and its current performance. This data might include the following:

- Full-time-equivalent (FTE) staff time and costs associated with each step in the process
- Members of staff (headcount) associated with steps in the process
- Delay time associated with each step in the process (also sometimes called lag time or flow time)
- Quality measurements, such as error rates, reject rates, customer complaints, or rework time
- Error analysis to determine the reasons transactions were rejected
- "Value-added" versus "non-value-added" content of each step, as discussed in the chapter on BPR tools
- Location (department) where each step is performed
- Number of and reasons for various approvals
- Number of storage (manual or electronic) systems for the data in the particular process
- Number of times the same data is entered throughout the process
- Process inputs and outputs
- Volume and type of transactions that flow through the process
- Transaction volumes over the past several years or cyclical nature of the workload

The detailed process map and the quantitative data are essential to understanding the current operation, identifying opportunities for improvement, and measuring future gains in performance. The map and data are truly the backbone of BPR and future process management. It is important to understand how processes currently work in order to improve them without wreaking havoc. The process teams will discover a wealth of ideas for improvement during this process baseline exercise. Interestingly, most of these ideas will be incremental in that they simply improve upon the existing process. The data collected in the next two activities will help generate the more radical improvement ideas.

II.2.2 Obtain Customer Input: Meeting and exceeding customer needs is the heart of any BPR effort. In this step, the process team collects three types of customer information: data related to customer satisfaction with current services, data regarding unmet customer needs and frustrations, and preliminary data related to customers' future systems requirements. Typically, the team collects this data through focus group sessions, customer interviews, and surveys as described in the tool on customer analysis in chapter III.

Qualitative, subjective customer information can be helpful to discover issues and trends; however, the team should ensure that its data-collection effort also produces quantifiable, verifiable results that can be replicated and measured over time to track improvement. This activity should produce several results:

- Customer priorities for improvements
- Indicators of current customer satisfaction
- The groundwork for a method to incorporate customer feedback into departmental and individual performance reviews on an ongoing basis
- A summary of the customer voice findings that can be routinely tracked and reported to the ESC

In addition, depending on the type of process being redesigned, the team may develop the initial draft systems requirements to support a redesigned process. This draft will need to be augmented once "visioning" is complete in the next task and system needs are more fully understood.

The process teams eventually compare this customer information against the Level II process baseline. Gaps in current performance versus customer needs or expectations are identified and are then used to stimulate visioning in Task II.3.

II.2.3 Research Best Practices: Just as talking to customers can generate a plethora of ideas, looking at other institutions can be fertile ground for excellent ideas and comparisons. When trying to figure out the best way to meet a customer's need and deliver a service, why reinvent the wheel? Many institutions, even organizations outside of higher education, manage very similar administrative processes (such as procuring goods, paying bills, billing clients, or managing facilities). Regardless of the organization, these processes provide similar services to similar types of customers.

Therefore, the process team should research for "best practice" ideas or benchmarks regarding the process itself *and its supporting technologies*. Through library research, NACUBO benchmarking participation, database inquiries, telephone or written surveys, systems vendor seminars, or peer site visits, the institution can gain a wealth of new ideas and practices. Keep in mind that throughout these exploration activities, the process team should research new technologies that may contribute to a process redesign. The whole point of BPR is to improve processes using any possible resource, and technology certainly is a powerful one. These best practice ideas are then compared to the process baseline and eventually help define the redesigned process. Techniques to collect this information are discussed in the benchmarking section of chapter III.

Task II.2 provides ammunition for improvement ideas, drawing on three diverse resources: the process baseline, customer input, and best practices research. The next task integrates these ideas by forming the redesigned process "vision."

Task II.3 Innovate

Once the Task II.2 data collection is complete, the creative part of redesign begins. In Task II.3, the process team pulls together all its ideas and analyses to brainstorm how this process should be redesigned from scratch. The team members usually meet for an intense several days to bring together all their ideas, "blue sky" the future, and emerge with a high-level redesign. During this time, the team members move through three major activities. Members begin by "visioning" the new process, then filter their options, and finally define change management needs. The key parts of each activity are described below.

II.3.1 Vision: Based on the best practice research, vendor information, and customer input, the team begins by defining the general attributes that the process should embody. For instance, in a procurement process, the team might specify that customers should have vendor and product information available online, paper purchase orders should be eliminated, the total number of vendors should be reduced from 20,000 to 200, and approvals by the budget office should be automated or eliminated.

These are broad goals, almost philosophical statements, about how this process should be structured and how customer needs should be addressed overall. These attributes provide a framework, or guiding principles, on which all team members should agree before beginning more detailed redesign.

Within these broad parameters, each process team then brainstorms on process redesigns to fulfill these defined attributes. The team usually does not have trouble coming up with a plethora of new

ideas, especially if the current processes and supporting systems have been well researched.

Ideas are generated in at least two ways. First, the detailed as-is process baseline is compared to customer needs, benchmarks, and best practice information to identify problems and opportunities for improvement. Second, the team needs to add its own creative ingenuity to the design. At this point, improvement ideas can be generated by challenging fundamental assumptions, assuming there are no limits to redesign, asking "what if," asking "why not," and team brainstorming. Furthermore, the questions identified in process flowchart analysis (discussed in chapter III) can help the process team challenge the current process and stimulate redesign ideas. The alternatives will be generated largely through trial and error until the most desirable design emerges.

The process team member who is the representative from the IT team also plays a critical role in this step as an IT expert and "creative technology thinker." This team member should help the team understand both the capabilities and the limits of technology to support new process designs. Ideas should not be based on the functionality of one or two vendor systems, but instead on the theoretical potential for technology.

Only when all ideas are out on the table should the team begin to analyze their respective feasibility and value. Knocking down ideas as they arise will certainly stifle team creativity and lower the group's results.

II.3.2 Filter Options: In the previous activity, the team generated as many ideas as possible in a free format, without screening too many suggestions. Now, the team should narrow the redesign alternatives down to the one-to-three most likely candidates and should further explore these alternatives. The team should first ask, "Does each design make good sense? Are we meeting our project's objectives and our customers' needs?" If so, then the design should be analyzed and further tested by creating new process flowcharts.

The team should sketch out a new process flowchart for each redesign alternative to thoroughly understand and ensure completeness of the design concept. Again, creating the flowchart can be facilitated by computer simulation, if the flowchart is sufficiently complex. As part of the flowchart creation and testing, the team should:

- Ensure that all inputs and outputs on the as-is flowchart are accounted for on the proposed model. If not, the team should have specifically decided to eliminate that input or output.
- List issues or assumptions particular to this redesign.
- Identify the strengths and weaknesses of the new design.
- Identify the critical success factors for implementation of this new process.
- Identify the barriers to success for implementing the redesigned process.
- Identify the effects on other processes throughout the institution.
- Assess any organizational changes required by the new process design.
- Identify any strategic advantages gained through the redesign.

The final result of Task II.3 should be consensus on the preferred "to-be" conceptual model for the redesigned process. Usually, this decision will be a natural progression of the team's analysis; however, the team may need to be assisted by an outside party to reach this decision. Only in extreme circumstances should senior management direct or override the group's decision. If teams ask the right questions throughout brainstorming and the subsequent analysis, they will generally have discarded unworkable solutions.

A Note on Quick Fixes: During this redesign phase, team members will probably discover many minor (and a few major) opportunities that can be addressed quickly and easily before implementing a completely redesigned process or new technology. If solving these problems does not interfere with the new design, the team should not hesitate to get people to work on them immediately.

II.3.3 Define Desired Change Management Outcomes: The change management baseline created in Phase I provides important information to the process teams as they evaluate the impact of the proposed redesigned process on the organization. Each team should meet with members of the CMT to discuss the environment that is required to implement and support the proposed redesign. A visioning of sorts for human resources occurs as the process team and CMT members begin to paint the picture of the new world of work. The group should develop its own human resource guiding

principles to direct development of new supporting policies.

Task II.4 Engineer

In Task II.4, the process team takes the broad parameters of the redesign vision and translates them into an actual process flow. How will this process really work? Where is data captured and how is the data later used? When, where, and how do people interact with the process—via computers, paper forms, telephones, etc.? What is the impact of the new process design? These questions are examples of information needed to flesh out the redesign model. Four major activities help the BPR teams to engineer the new process(es) and estimate the costs and benefits of implementing the new model. The activities, as would be expected, focus on the process itself, technology, change management, and cost/benefit analysis.

II.4.1 Complete Detailed Process Design: Each process team fleshes out the redesign model for its particular core process by:

- adding greater detail to the high-level proposed process flowchart created in the previous Task II.3;
- designing a performance measurement system for the process, including quality, time, cost, and service metrics;
- estimating the staff resources that will be required to support each piece of the process, including number of staff, skills, and management level;
- identifying major policy changes that must be addressed to support the new process; and
- augmenting the lists of strengths, weaknesses, critical success factors, barriers to success, organizational impacts, strategic advantages, issues, and assumptions.

This information, along with the systems specifications and cost-benefit analyses, will be brought to the ESC for its approval and commitment to the preliminary design concept.

II.4.2 Specify Information Systems: Based on the to-be vision for the process, the draft systems requirements can be enhanced, completed, and prioritized. These requirements are packaged into a request for proposal (RFP) to send to technology vendors. Criteria for vendor selection are established, packages are evaluated, and the institution decides whether to purchase off-the-shelf software or to develop its own custom software to support the defined processes. The costs of the technology solutions are included in the cost-benefits analyses in II.4.4.

II.4.3 Specify Change Management Actions: As the team(s) finalizes its re-engineered process proposal, the CMT assesses its agenda for Phase III. The first area of concern is in the management of employee morale and emotions. Strategies to help ensure acceptance of BPR should be discussed and implemented. To support the process teams, the communication plan should be updated and strategies to access managers and employees at all levels should be devised. Although memos and written communication are important communication vehicles, more one-on-one and face-to-face discussions should occur. Opportunities should be given for employees to express their individual concerns regarding the proposed changes. This process will enlighten those more closely involved in the BPR effort and will send important signals regarding ways in which the BPR messages can be most effectively communicated.

The second area of action addresses the human resources infrastructure. The CMT should establish the broad policy changes that will be needed in the future. These policies provide the framework for the detailed work of the human resource department in Phase III. The resource plan should provide general direction for detailed implementation plans in areas including personnel policies and procedures, and performance metrics and evaluation.

Finally, the severance plans and redeployment policies should be firmly in place and included as part of the overall communications plan.

II.4.4 Quantify Costs and Benefits: The number of redesign alternatives that are rigorously evaluated through a cost-benefit analysis depends on several factors, including the degree to which the team believes in the "worth" of the competing alternatives and the amount of time the team can commit to the analysis. In some instances, the team will emerge with a design that must be accepted in totality for the benefits to be gained. Or, the team may create a redesigned process in which various subprocesses can be implemented independently

of the other aspects of the redesigned process. Alternatively, the team may have difficulty selecting just one alternative, and the cost-benefit analysis of several alternatives can help clarify its choice. Standard net present value (NPV) calculations should be performed for all costs and benefits, including:

- process efficiencies (savings) gained;
- enhanced revenues, if any;
- increased or decreased staff resource requirements;
- reduced error or rework rates;
- cost of added services;
- consulting and/or vendor fees;
- hardware, software, and implementation costs;
- training costs; and
- displacement program costs.

Specific qualitative benefits should also be clearly described and presented with the quantitative results. This cost/benefit analysis is the cornerstone of the presentation to the ESC. As executives, they will want to know both the service improvements the institution can expect and the dollars that may be saved. With this information they can make an informed decision regarding implementation.

Task II.5 Obtain Commitment

The process teams have completed a massive amount of work by this point in Phase II and are ready to present their findings and recommendations to the ESC. Phase III will require significant institutional resources, both human and capital, and thus a deliberate, strategic decision needs to be made before proceeding. This final task of Phase II affords the institution the opportunity to review both work to date and proposed plans as part of an ESC presentation.

II.5.1 Executive Steering Committee Presentation: As in Phase I, the process teams must again obtain the commitment of the executive steering committee to proceed with the implementation of the proposed redesign. Again, the support of these leaders is critical to implementing any redesigns in the future, especially if the processes are cross-functional. Because core processes tend to wind their way through many departments and units, the offices managed by members of the ESC will surely be affected by the proposed change. It will be important to discuss not only process change, but also people change. Members of the ESC need to be actively out in front of the implementation. It cannot be overemphasized that enthusiasm is needed to instill confidence in employees and to pave the way for change. If they are unsupportive or skeptical, this attitude will carry over to the staff in their departments who are affected, and may slow the implementation of the process, reducing the overall benefits of the redesign. The outcome of this presentation will be a decision to halt or to proceed with Phase III, with a formal commitment to the vendor selection or custom system development, schedule, estimated costs, level of effort required, and anticipated results.

This presentation concludes Phase II. The BPR effort again expands as it moves into Phase III and begins with an intensive planning effort, as described in the next section.

Phase III: Realize—Making the Breakthrough

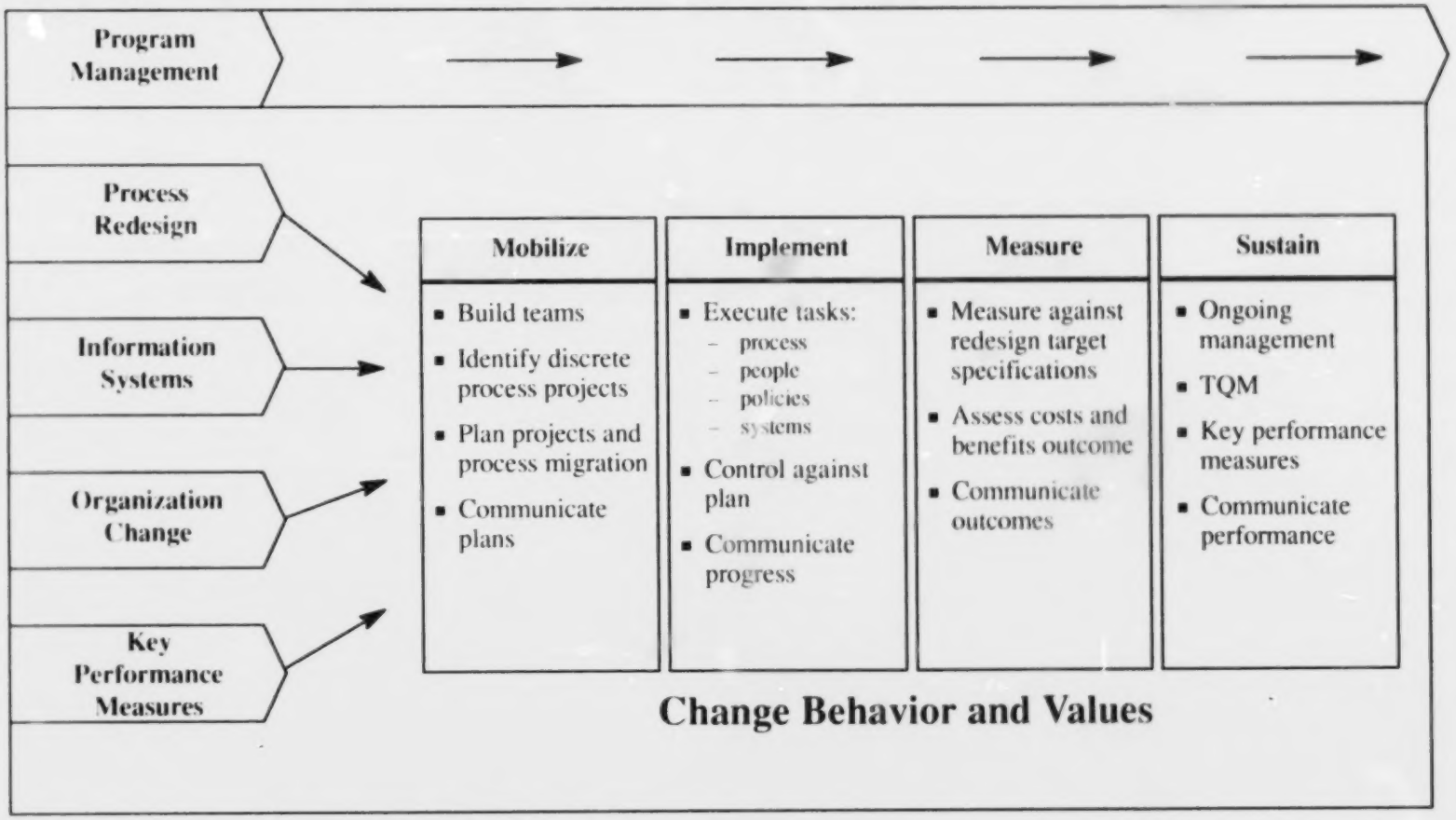
The wide range of potential outcomes and action plans inherent in implementing a process redesign precludes the provision of precise action steps or tasks which comprise Phase III. Rather, a broad framework of Phase III is provided to guide the implementation of the proposed processes, as depicted in exhibit 13. If a good job has been done in Phases I and II, the technical aspects of Phase III are much easier than in the earlier phases. The change management aspects of Phase III will prove the most challenging, as the new processes will fundamentally alter the way each individual, as well as the organization as a whole, works.

Task III.1 Mobilize

At this point the BPR leader, drawing from the process teams in Phase II and from the staff members who will be working on the to-be process, organizes implementation teams. The more people involved in this phase, the better, as this will encourage acceptance of change. The process team members from Phase II often lead the implementation teams, thus bringing the benefits of training and team building from Phase II. New team members should have a chance to review the redesign and contribute any other ideas before detailed planning in this step begins.

Exhibit 13.
BPR for Higher Education — Phase III Components

The components of *Phase III — Realize* cover a number of workstreams:



Generally, implementing each redesigned process requires multiple, discrete projects to address a variety of issues related to that process. The discrete projects allow the organization to transition from the as-is to the to-be process. Planning for the discrete projects includes determining specific timeframes, the priority of each project, resource requirements (type and number of staff), systems implementation components, communication with the campus and with other processes, personnel policies, new performance measurements (for both the process and the workers), and controls. Certain aspects of implementation will present significant challenges to the organization, while others will be more easily managed. For example, if the redesign calls for new technology, the organization may have adequate processes and experience for this task, as most IT support organizations have experience implementing systems. Other aspects of implementation may be more challenging. In particular, projects that require cross-functional cooperation or radically different human resource needs require more focus and resources during implementation. How will the process operate across departmental boundaries? Who will do what and when? What organizational changes are required? The logical focal point for this coordination is the process owner, who will continue to be supported by the human resource department and the implementation team members.

Task III.2 Implement New Process and Systems

Technically, this stage will consist of executing implementation tasks according to a clearly articulated implementation plan. However, any complex change is bound to have a few "glitches," both during installation and immediately afterwards. Also, other processes that are connected with the new one may require additional minor modifications or enhancements to adjust to the redesigned process' new level of performance. These modifications can be opportunities to further involve staff in perfecting the new way of working. If the intent is to introduce continuous improvement (TQM), these small problems are ideal for manager or employee TQM teams to resolve.

Also, managers may ensure that employees start out on the right foot by using the process as intended. Formal training with close attention for several months afterward will ensure that staff members both support and use the process properly.

Task III.3 Measure

An unmonitored process soon declines in its performance. Furthermore, it tends to exhibit the same growing, spreading, and mutating behavior that caused a need for BPR in the first place. Without well-constructed, quantitative performance measures and management attention, dramatic improvements will slowly unravel. Following installation of the new procedures, policies, and/or systems, managers should start measuring increased performance on a routine basis. As quickly as possible, managers should confirm the cost-benefit calculations performed earlier in Phase II.

Task III.4 Sustain

Ongoing attention to further improvements through TQM is an excellent way to ensure that progress is not lost but rather is enhanced or even accelerated. To avoid redesigning a process again in the near future, it should be continually improved in incremental ways. The process owner should ensure that ongoing performance is routinely measured and communicated to workers throughout the process—and even to customers. The process owner should also ensure that the process is continually improved, with quantitative measurements providing indisputable evidence of improvement.

A Last Note—Information Technology: An Integral Part of BPR

In the past, technology has been used to "pave the cow paths." Newly purchased systems were made to conform to an institution's existing ways. Thus, inefficient and ineffective processes were automated. Software vendors created technological solutions that were mainframe and departmentally based, rather than process based. Their clients were the central office administrators, and, as a result, their software mirrored college and university centralized administrative functions. As such, the software emulated the "functional silos," like tall isolated grain silos, of the institution. The advent of the desktop computer and the decentrali-

zation of IT is a major force in BPR, accelerating the trend to change the nature of work and to delegate responsibility for recording, verifying, and approving most transactions at the beginning of the process. In addition, bar coding, scanning, portable hand-held data-entry equipment, and other innovations are increasingly being applied to routine business processes, and thus change the way business is conducted and the way in which customers and process participants interact.

To take full advantage of technology innovation, BPR carefully links process improvement and the search for technological solutions. This marriage of process redesign and technology distinguishes BPR from other process improvement efforts and from other systems implementation efforts. In BPR, process improvement does not precede technology identification, nor does system selection drive process improvement. Rather an integrated process ensues. BPR teams search for technological solutions as part of benchmarking and best practice research *before* redesigning the process. They also explore the ways that technology can support or accelerate during visioning. This symbiotic process pulls process and technology together. This tightly orchestrated interaction between IT and process improvement is the critical element that causes breakthrough innovation, allowing the institution to transform the process.

Many experts liken BPR's use of technology to an enabler. However, the point to be made is that in BPR, technology does so much more than enable the creation of a new design. Granted, moving from paving the cowpaths to enabling a situation in which change may occur is a shift in the right direction. Such a step moves an organization from using IT to automate existing processes to undertaking process improvement planning prior to IT planning. Nevertheless, BPR—more radically—builds brand new routes leading to a quantum leap in service levels and reduced costs.

Chapter III

Tools for Business Process Redesign

Introduction

Although bold and comprehensive, BPR is also a methodology firmly grounded in detailed facts—facts derived from hard data, objective analyses, and customer input. So, how exactly does an institution go about securing this valuable information to discover opportunities and to devise the best possible redesign? In addition to providing a conceptual framework for change, BPR offers a versatile toolkit to help make these discoveries. With this toolkit, teams can do the following:

1) Focus first and always on customers—What do they want? Are they satisfied?
2) Thoroughly understand how work currently is done—the actual costs and steps employed.
3) Understand how employees spend their time.
4) Quantify costs or other hard data about a process—prove the need for change.
5) Identify problems and opportunities—Where is the process inefficient? What are the causes of these inefficiencies?
6) Generate many promising improvement ideas.
7) Redesign the process.
8) Prioritize improvement efforts.
9) Estimate potential savings.
10) Get team members to think objectively—focus on the results that need to be achieved.

Who Should Use this Toolkit?

From senior management to BPR team members, everyone involved in a BPR effort should—at a minimum—skim this section to better understand the mechanics of BPR. BPR team members will derive the most benefit from a thorough study of this chapter. Team members will be charged with the institution's data-collection efforts and will be required to learn how to apply these tools to a variety of processes. As such, this chapter serves as a training module for BPR team members.

Institutions that enlist outside support to help structure such an intensive effort will rely on consultants to collect the data. In spite of the fact that the data are collected and analyzed by outside resources, members of oversight committees would do well to obtain a thorough understanding of these tools to better understand the results of the consultant's efforts.

What Is in the Toolkit?

Of the virtually unlimited arsenal of analytical tools, this chapter presents seven that are frequently used in re-engineering. Brief descriptions of these seven tools are described below.

Value-Added/Non-Value-Added (VA/NVA) Analysis: Distinguishes between those activities that are truly essential from the *customer's perspective* (i.e., have value) and those that are not essential to the customer and should be minimized over time. Helps analysts reduce complexity in a process and redesign a process to focus on what is really important to customers. VA/NVA analysis is used with work distribution chart (WDC) analysis or process flowchart analysis.

Work Distribution Chart (WDC) Analysis: Describes the staff time and costs expended on activities within a department or a process. WDC analysis helps prioritize areas for improvement.

Process Flowchart Analysis: Creates a step-by-step diagram of how work is done in a particular process; tracks a wealth of data about that process, such as costs, time, delays, and errors. Helps analysts develop many redesign ideas and provides a basis against which improvements can be measured.

Cost of Quality (COQ) Analysis: Categorizes and quantifies the cost of various types of non-value-

added activities. COQ analysis is helpful in designing new approaches to ensure high quality in processes and in more accurately estimating potential savings. It is used with WDC analysis or process flowchart analysis.

Volume Analysis: Evaluates the different types and numbers of transactions that flow through a process and affect employee workload. Helps analysts with three aspects of redesign: determining types of special handling for transactions, appropriate approval requirements, and reasonability of employee workload.

Benchmarking: Compares the performance of one process to that of other processes within the same institution, other institutions, or even other companies outside higher education. This is one of the best ways to generate new ideas for process redesign and to prove the need for change.

Customer Analysis: Measures current customer satisfaction, identifies key areas for improvement, and identifies potential future customer needs.

The matrix in exhibit 14 shows the variety of purposes that each tool can fulfill. The tools are effective because each meets several, diverse needs, and all highlight inefficiencies, generate improvement ideas, and help team members think objectively.

What Is Included in Each Tool Description?

The explanation of each tool in this chapter is structured into roughly five sections:

- **Objectives and Overview**: Briefly describes the tool itself
- **Suggested Use and Application**: Highlights the different ways to use the tool and the results that distinguish the different applications
- **Directions**: Provides explicit instructions for using the tool, collecting data, and conducting the analysis.
- **Interpreting the Results:** Suggests issues and questions for consideration when analyzing results. The exhibits usually provide examples of spreadsheets or graphs that can be used for data analysis; for some tools, the appendices provide sample forms for data collection.
- **Concluding Comments**: Summarizes the tool and provides any additional helpful hints or warnings.

How Should This Chapter Be Read?

This chapter is quite detailed and includes step-by-step instructions for BPR team members to actually execute each tool. Executives or casual readers simply may want to skim the two brief sections for each tool titled "Objectives and Overview," and "Suggested Use and Application." Those who wish to actually apply a particular tool should, of course, thoroughly read all sections and should refer to appropriate parts of the case studies in the next chapter for examples of application.

Value-Added/Non-Value-Added Assessment

Objectives and Overview

The objective of value-added/non-value-added (VA/NVA) assessment is to distinguish between those activities that are truly essential from the *customer's* point of view and those which are not essential to the customer and should be minimized or even eliminated from the process over time. Value-added concepts are important because processes sometimes become overly complex and bogged down by not very meaningful (hence "non-value-added") steps as processes grow and evolve over time. Value-added/non-value-added assessment helps analysts reduce complexity and redesign processes to focus on creating the product or service that the customers truly value (hence "value-added").

VA/NVA is actually a basic BPR *principle*, used as part of many other tools. Specifically, VA/NVA assessment is used with other tools to:

- Identify and quantify the time and costs associated with non-value-added activities
- Identify opportunities to reduce process complexity by reducing VA/NVA activities
- Estimate cost savings achieved by reducing VA/NVA activities

VA/NVA assessment is one of the most important principles in redesigning processes to address true customer needs. Implementing VA/NVA assessment separates the wheat from the chaff and

Exhibit 14.
Needs Which Each BPR Tool Can Fulfill

BPR Tools \ Needs	Understand How Work Currently Is Done	Understand Use of Employee Resources	Identify Process Complexity; Highlight Inefficiencies	Identify Opportunities; Generate Improvement Ideas	Quantify Time and Costs	Estimate Potential Savings	Stratify Transactions, Set Approval Structure, Evaluate Workload	Determine Customer Needs; What's *Essential* to the Process	Prioritize Improvement Efforts	Help BPR Team Members Think Objectively
Value-Added/Non-Value-Added Analysis			✓	✓		✓		✓	✓	✓
Work Distribution Chart Analysis	✓	✓	✓	✓	✓	✓			✓	✓
Using a Process Flowchart	✓		✓	✓	✓	✓				✓
Cost of Quality Analysis	✓		✓	✓		✓		✓	✓	✓
Volume Analysis	✓	✓	✓	✓			✓			✓
Benchmarking			✓	✓			✓	✓	✓	✓
Customer Analysis			✓	✓				✓	✓	✓

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leaves only those activities that are essential to customers.

VA/NVA assessment is discussed first in this chapter on BPR tools because the VA/NVA concepts underpin many of the remaining BPR tools.

Suggested Use and Application

VA/NVA principles can be applied in conjunction with other tools in at least three ways:

Application	Distinguishing Results
Activity analysis of a *process*, where discrete steps in a detailed process flow are classified as VA or NVA (used with either the Work Distribution Chart, Cost of Quality Analysis, or Process Flow Analysis tools).	Data will focus on the costs of the NVA activities which are part of a particular *cross-functional process*. Eventual cost savings will be achieved through cross-functional improvement efforts.
Activity analysis of an *entire unit*, where each activity in that unit's operation is classified as VA or NVA (used with the Work Distribution Chart or Cost of Quality Analysis tools).	Data and analyses will focus on an *entire unit*. Costs and savings will be estimated based on the unit's internal improvement activities only, although ability to achieve improvements may rest with managers outside the particular unit.
Customer groups, where customers are asked to identify those *services* which are essential, nice but not essential, or optional (used with the Customer Analysis tool).	Data will focus on the *"outputs"* of a process, not the process itself nor the departments involved. Improvements will be achieved by changing the service or product mix (i.e., eliminating some old and/or instituting other new services or products).

Theoretical Framework

For the other highly *quantitative* BPR tools in this chapter, specific directions for application and analysis are listed in this third section of the tool description. However, VA/NVA is a *qualitative* tool that is used to make judgments about the value of activities in a work environment. Therefore, this section lists the evaluation criteria for judging an activity as value added. VA/NVA becomes a powerful tool when it is used with other quantitative BPR tools to support analyses. Specific instructions on using VA/NVA in concert with other tools are included in part of the "Directions" section in those tools.

By answering the four questions below, team members can determine if an activity adds value.

Could this activity be eliminated if some prior activity were done differently or correctly?

If yes: NVA

If an activity exists simply to compensate for poor quality workmanship "upstream" in a process, then the activity is non-value-added. Furthermore, if improved coordination, communication, or other process redesign would eliminate the need for this activity, then it is also NVA. Note that simply moving an activity from one point to another earlier upstream in the process does not eliminate the NVA activities from the process overall. The activity must be removed from the process entirely.

NVA activities that belong in this category include, but are not limited to, inspections, approvals, proofreading, error research/correction, document or data replacement, rework, idle time, complaint investigation/response, or additional filing.

Does technology exist that would eliminate this activity?

If yes: NVA

Most institutions of higher education do not fully leverage existing technology or sufficiently invest in available technologies. If the particular activity (or more likely, whole groups of activities) could be eliminated by better utilizing technology, then the activity is NVA. NVA activities that stem from underuse or misuse of technology include coding forms by hand, key punching, batching (grouping) forms for processing, sorting, hand mailing where E-mail is available, budget checking, error checking, verifying data, entering duplicate data, or reconciling data.

Could this activity be eliminated without affecting the form, use, or purpose of the final product or service from the customer's perspective?

If yes: NVA

The key issue is, "Will the customer care if this activity is done or not?" If desired output can be delivered to the customer without this activity, then the activity is NVA. NVA activities of this type usually result from either internal controls or a misunderstanding of the true customer needs.

Keep in mind that it is usually impossible to eliminate all NVA activities. Some activities may be important or even required, but they may still be NVA from the customer's perspective. For instance, certain internal controls (approvals, audit trails, random audits, etc.) will always be necessary; however, they also will always be non-value-added from the customer's perspective, regardless of the important role they play for the institution. Instead of layering on "blanket" or additional controls, institutions should specifically identify and quantify potential risks inherent in a process on an ongoing basis. The institution's objective should be to design control structures that address the identified risks and simultaneously minimize NVA activities, therefore reducing costs.

As another example, misunderstanding customer needs or inappropriately delivering the products/services also results in NVA activities. No benefit can be gained from doing something the customer does not want done. These NVA activities can be eliminated by more effectively identifying and meeting customer needs and/or by more effectively designing processes to meet those needs.

Is this activity required by a customer, and will that customer pay for this activity?

If yes: Value Added (VA)

Only activities for which the answer to this question is "yes" may be classified as value-added from the customer's perspective. Institutions must continually reevaluate products and services to ensure that they are consistent with changing customer demands. Managers must also ensure that processes delivering these products/services are as efficient as possible. These concepts apply whether the customers pay for the product/service directly or indirectly (e.g., recharges, overhead rate, indirect cost recovery). Directly or indirectly, customers eventually pay for the output and will have opinions as to the need for and quality of those products or services.

The above questions are simple but compelling. They distill the value-added activities and focus the BPR team on meeting customer needs and eliminating waste. Now that the theoretical framework of VA/NVA exists, it is time to illustrate these concepts through an example. Further examples are also included in the case studies in chapter IV.

Exhibit 15 diagrams the activities required to record a transfer of funds (TOF) on a university's official budget as part of its general ledger. In this specific example, a new grant has been received that triggers a transfer of funds from a holding account to a particular departmental account. Which of the activities are value-added?

Exhibit 16 presents the same process flow except that the NVA activities are shaded. The table on page 48 lists the activities from the diagram, classifies each as VA or NVA, and then gives a brief rationale for the classification.

By following this example, it becomes apparent that receiving and recording the grant award letter is the only essential step from the customer's perspective. The institution may need to have approvals for purposes of internal control, but approvals do not add value from the customer's perspective. The objective in redesign should be to minimize the number of approvals while still maintaining adequate control. Other NVA activities, such as logging, batching, delivering, and sorting, should also be eliminated in the process redesign. This example demonstrates how VA/NVA principles help to redesign the process by assuming the customer's perspective and eliminating, where possible, activities that are not essential to customers.

Concluding Comments

Value-added/non-value-added assessment is a critical tool in redesign. Analysts use VA/NVA to challenge existing processes and to identify those few activities that are essential to the external customer. Although these assessments may be controversial if the criteria are unclear to some departmental employees, the assessments are important because they immediately focus the BPR team on the critical parts of each process and the potential opportunities to eliminate waste. VA/NVA assessment does not determine that an employee is non-value-added but instead identifies *work* that is NVA. The employee's time can be better utilized performing *value-added* activities elsewhere in the process or institution, usually with much greater employee satisfaction. Several of the remaining tools utilize VA/NVA assessment as an important part of their analyses. Detailed examples of VA/NVA concepts, their use with other tools, and their application in practice are presented in the case studies in chapter IV, Examples from Practice.

Exhibit 15.
Example of Value-Added/Non-Value-Added Assessment current Process to Record a Transfer of Funds (TOF) on the University's General Ledger

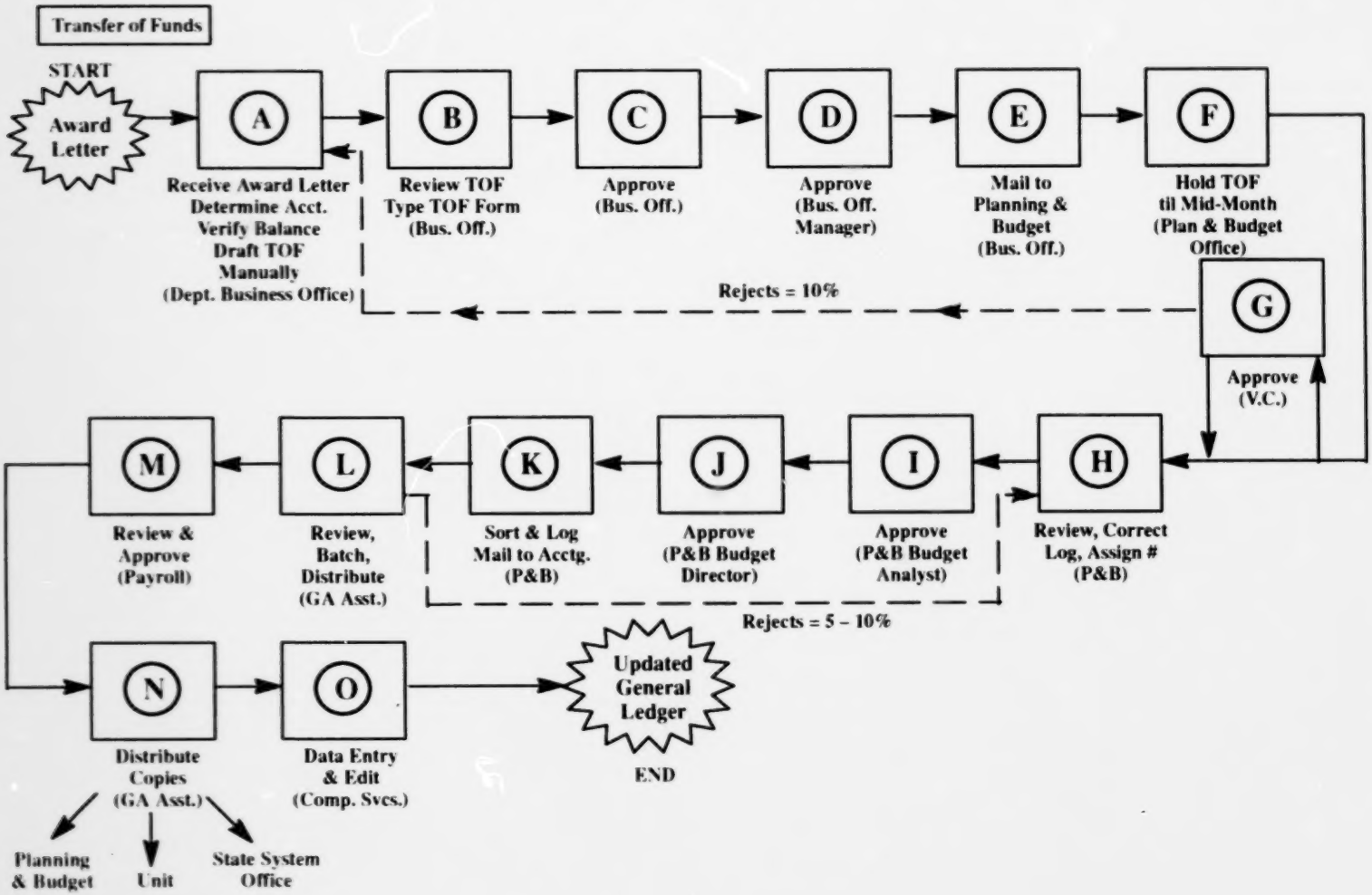
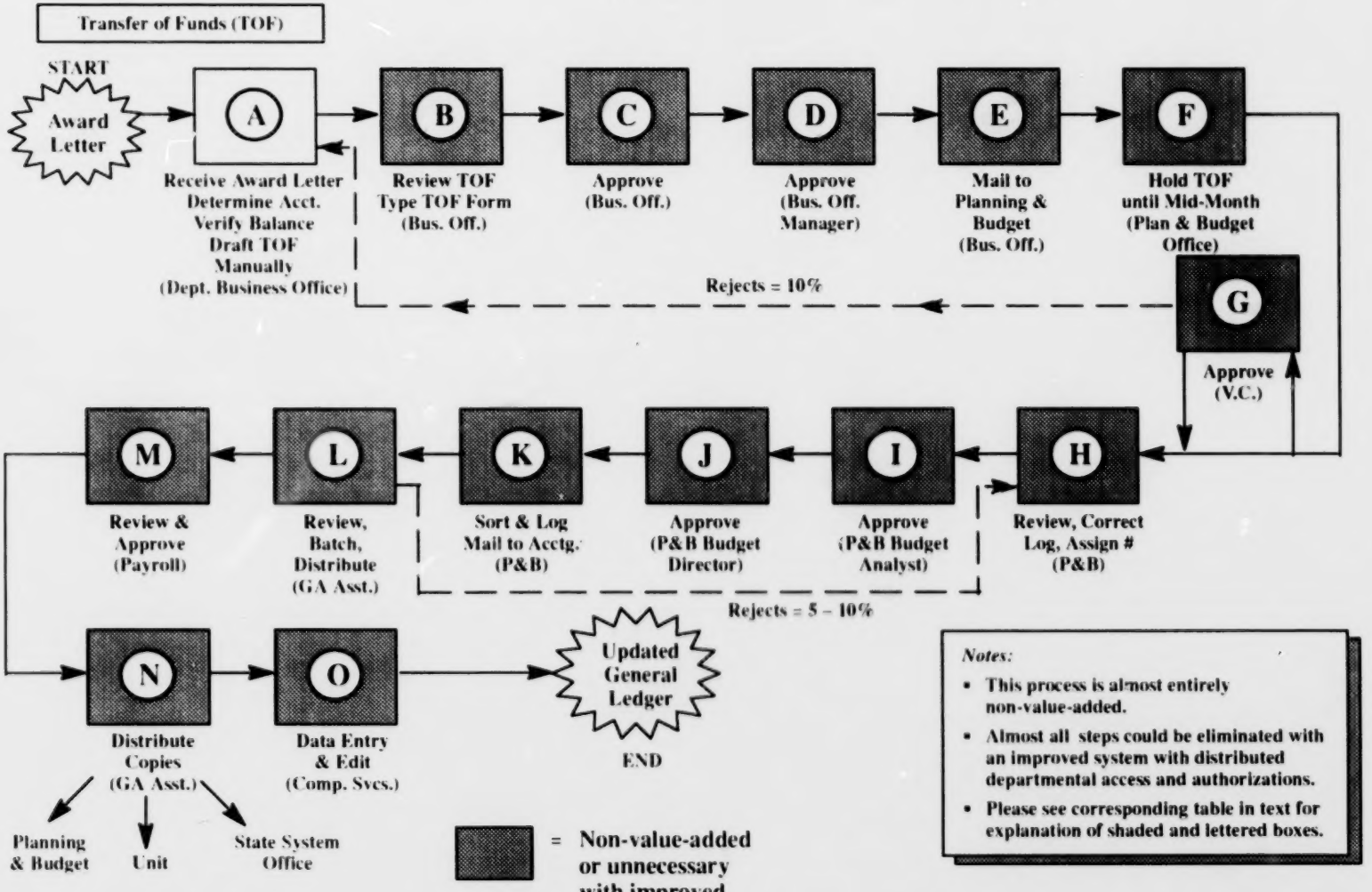


Exhibit 16.
Example of Value-Added/Non-Value-Added Assessment current Process to Record a Transfer of Funds (TOF) on the University's General Ledger



Box	*Activity*	*VA/ NVA*	*Brief Rationale*
A	Receive award letter	VA	Award letter must be read and fed into the university's system. Data should be entered directly into system.
B	Review & type	NVA	Already recorded once by hand.
C	Approve TOF	NVA	This step may be necessary for internal control purposes, but it's not essential from the customer's perspective. Approvals may be *necessary* in some cases, but they're always NVA.
D	Approve TOF	NVA	This step may be necessary for internal control purposes, but it's not essential from the customer's perspective.
E	Mail TOF	NVA	Unnecessary if automated system.
F	Hold TOF	NVA	Unnecessary if automated system, would update immediately.
G	Approve TOF	NVA	Unnecessary to have this level of approval for all transaction types
H	Review, log	NVA	Manual tracking system; unnecessary
I	Approve TOF	NVA	This step may be necessary for internal control purposes, but it's not essential from the customer's perspective.
J	Approve TOF	NVA	Only one approval should be required.
K	Sort, log, mail	NVA	Unnecessary with automated system.
L	Review, batch	NVA	Unnecessary with automated system.
M	Approve TOF	NVA	Unnecessary with automated system. Controlling *access to information*, not the transaction itself.
N	Distribute copies	NVA	Unnecessary with automated system.
O	Data entry	NVA	Data entry should be done at the originating department level in lieu of typing a paper, carbon copy form. Then, this data entry step would be unnecessary.

Rationale for Value-Added versus Non-Value-Added Assessment

Work Distribution Chart Analysis

Objectives and Overview

In a general sense, a work distribution chart (WDC) is an effective tool because it creates hard data and looks at work from a nontraditional perspective. Instead of evaluating the cost of a whole function or department, a WDC analysis considers the activities—the actual work—that occur within that department or process. Analysis of these small building blocks is critical when reconfiguring work as part of redesign.

The objectives of this tool are to identify the activities that comprise a unit or process and then to estimate the corresponding time and dollars expended on each of these activities. Specifically, the WDC is used to:

- identify the activities that comprise most of the work in a department or process;
- quantify the cost of each activity in terms of the cost of staff salaries and benefits;
- help managers establish the priority of activities;
- determine how employee time is allocated throughout a department or process;
- generally assess overall productivity; and
- begin to develop ideas for process improvement and better use of resources.

The basic components of a WDC analysis include:

- An "activity dictionary" that lists and briefly defines all activities so that employees report their data based on a common understanding of the defined activities.

- A data-collection form on which each employee allocates his or her time across the defined set of activities.
- A spreadsheet or relational database to analyze the employee responses.
- A set of questions to help analyze the data, interpret results, and generate ideas for redesign.

Suggested Use and Application

A work distribution analysis can be applied in two ways:

Application	Distinguishing Results
1) To an entire *unit*, where every employee in the unit (including management) allocates 100 percent of his or her time across the defined set of activities that make up that unit's operations.	In this instance, data and analyses will focus on an entire unit. Costs and savings will be estimated based on internal improvement activities within that unit only, although ability to achieve improvements may rest with managers outside the particular unit.
2) To an entire *process*, where every employee involved with the process (regardless of his or her department) estimates his or her time allocated to the defined set of steps in that process.	At this level, data will center on the costs of the particular cross-functional process. Cost savings will be achieved through collaborative, cross-functional improvement efforts.

For demonstration purposes, it is best to assume the perspective of the first application. However, the concepts, directions, data templates, and analyses can be applied equally in either scenario.

Directions

The steps listed below outline the procedures involved in completing a work distribution chart.

1) Identify and create a list of approximately 10 to 15 "major categories" for departmental activities.
- Derive the list from interviews and prior knowledge of the unit, identifying the key services for which the unit is responsible.
- Some of the major categories should capture miscellaneous work activities, such as training, supervision, reporting, or internal communication.
- The lists in exhibit 17 provide two examples of "major categories." The list on the left was compiled for an analysis of a purchasing department. The list on the right of the exhibit was created for the analysis of a small college's central administration.
- Activities must be tailored to the needs of the unit. The analyst may choose to create a major category within a particular unit because of prior knowledge that the category is a potential trouble area (such as "Gather Statistical Information" on the left of the exhibit), where ordinarily the category would fall under a broader heading (such as "General Office Administration and Management" in this case).

2) Break out the discrete activities that fall into each of the major categories.
- The list of discrete activities should be neither overly detailed nor too abstract (or "high level").
- As a guide, each major category should encompass roughly 5 to 12 discrete activities.
- Some major categories can stand alone, with no discrete activities listed under the main heading, such as the "Gather Statistical Information" in the exhibit. Major categories stand alone if the category is a "catch all" for insignificant activities or the category is a potential trouble spot intended to isolate data for one particular troubling or time-consuming activity.

3) Briefly define each discrete activity to ensure common understanding and use of the activity terms.
- These definitions comprise an activity dictionary.
- Do not develop definitions for each of the 10 to 15 major category headers, unless it is a "stand-alone" category.
- A sample, complete activity dictionary for a small college's administration is included in appendix A, Work Distribution Chart: Sample Forms.
- Omitting important activities will result in incomplete analysis; ensure that the list of activities encompasses all major activities of the entire unit (usually those activities which consume more than 5 percent of employee time).

4) Develop a list of all employees, positions, salaries, and benefit rates.

5) Create a data-collection form and collect each employee's WDC data.
- A sample cover letter, list of instructions, and

Exhibit 17.
Two Examples of "Major Categories" for WDC Activities

For a Purchasing Department

- Process Purchase Orders
- Resolve PO/Invoice Discrepancies
- Review Terms & Conditions of New Contracts
- Establish and Monitor Ongoing University Contracts
- Incorporate and Oversee Bidding Procedures
- Conduct Formal Bid Process
- Participate in Campus Committees
- Gather Statistical Information
- File and Manage Records
- Conduct "Understanding Purchasing" Workshops
- Provide Technical Purchasing Advice
- Provide Computer System Support or Analysis
- General Office Administration & Management

For the Administration of a Small College*

- Accounting/Financial Services
- General Supervision and Management
- Computer Services and Support
- Direct Academic, Community, or Student Services
- Grants and Contracts Management
- Internal Communications
- Payroll
- Personnel
- Planning
- Public Relations/External Communications
- Reporting
- Secretarial and Clerical Tasks

* *Note: These are the major categories for the sample Activity Dictionary presented in Appendix A, Work Distribution Chart: Sample Forms.*

data-collection form are also included in appendix A.

- A response rate as close as possible to 100 percent is critical for data analysis and accuracy.
- The forms should be filled out by the unit's employees; each employee fills out his or her own form.
- If union or other issues increase the sensitivity of the data collection and analysis, supervisors may complete one form for their respective groups, indicating at the top of the form the number of employees represented by the single response.

6) Enter, aggregate, and analyze data via a spreadsheet or a database. The data analysis can be performed on either a standard spreadsheet or a relational database. For one-time users, for analysis of a small number of employees, or for those not familiar with a database, the spreadsheet is the simpler approach. Otherwise, the database is a more robust tool that requires less modification each time a new analysis is performed. The basics for each are described below.

Spreadsheet

- The chart in exhibit 18 presents a sample format for a spreadsheet analysis. For this discussion, columns are labeled A through P, and rows are labeled 1 through 161 as noted on the chart.
- The activities are listed down the left side of the page in column A, while the employee titles are listed at the head of each column B through K.
- Each employee's salary is listed under his or her title, in row 2. Salaries, in this example, are inflated by 29 percent to include the cost of fringe benefits at this institution.
- The responses from each employee's data-entry form are listed down his or her column. Thus, the director of business affairs spends 2 percent of his or her time on budget tracking, 2 percent on purchasing, 30 percent on direct supervision, and so on.
- The formulas for columns L, M, N, O, and P are shown on the sample chart.
  - Column L represents the total number of FTE employees who spend time on the particular activity.
  - Column M represents the percentage of time spent by all employees in the college on each discrete activity.
  - Column N represents the total dollars (in staff salaries and benefits) expended on each activity.
  - Column O contains the "headcount" or total number of employees who listed each discrete activity on his or her data-collection form.
  - Column P contains the "fragmentation ratio" for each discrete activity. The fragmentation ratio is the total number of employees (headcount) performing an activity divided by the number of full-time-equivalent employees performing that same activity. A high fragmentation ratio implies that a large number of staff individually spend small amounts of time on the particular activity. Of course, some activities should have high ratios (such as planning, problem resolution, program development, or participation in committees), as they support consensus building, collaboration, and cross-functional activities. However, most business-related activities do not usually require this approach and should not be as highly fragmented. This ratio helps the BPR team identify activities that can be consolidated to one (or just a few) employee(s) to improve processing and use of resources.
- For the major categories, total the time and costs for the activities that fall under each category. (See rows 3, 153, and 157, for example.)
  - Cell 153L contains the total number of FTE employees who spend time on all the discrete activities within the major category called "Administration."
  - Cell 153M contains the time spent by all employees on all the discrete activities within the major category called "Administration" as a percentage of total FTE employees.
  - Cell 153N represents the total staffing dollars spent on all the discrete activities within the major category called "Administration."

Relational Database

This description assumes the reader is already familiar with database concepts and usage. To use a database for analysis of WDC data, unique codes will need to be assigned to all components of infor-

Exhibit 18.
Sample Format for WDC Spreadsheet Analysis

Employee Data Responses

	A	B	C	D	E	...	L	M	N	O	P
1	Activities	Director Business Affairs	Manager Grants & Contracts	Financial Analyst	Data-Entry Clerk		FTE Staff	% of Total College Time	Total Costs	Head Count	Fragmentation Ratio
2	**Salaries**	$76,452	$49,870	$38,117	$23,773		87	100%	$3,960,927	87	
3	**Accounting**						10.27	11.8%	$483,271		
4	Budget Tracking	2%	3%	10%			1.78	2.0%	$74,705	22	12.4
5	Budget Reporting			10%			1.22	1.4%	$53,131	11	9.0
6	Purchasing	2%	2%	5%	5%		1.56	1.8%	$59,532	18	11.5
7	Accounts Payable				15%		.80	1.0%	$26,186	8	10.0
8	Accounts Payable Adjustments				10%		.55	0.6%	$18,460	7	12.7
9	Accounts Receivable				15%		1.15	1.3%	$28,768	11	9.6
10	Accounts Receive Adjustments				10%		.60	0.7%	$18,173	8	13.3
11	Travel Management			10%			.40	0.5%	$16,330	7	17.5
	⋮						⋮				
153	**Administration**						10.25	12.3%	$516,962		
154	Direct Supervision	30%	22%				5.34	6.1%	$270,492	41	7.7
155	Indirect Supervision	15%	11%				2.85	3.3%	$149,983	31	12.6
156	Training		8%				2.06	2.4%	$96,487	31	15.1
157	**Grants & Contracts**						2.70	3.1%	$150,885		
158	G&C Administration		27%				1.45	1.7%	$77,087	10	13.3
159	G&C Proposal Preparation		15%				.82	0.9%	$46,366	11	13.4
160	G&C Audits		5%				.43	0.5%	$27,432	5	11.6
161	**TOTALS**	100%	100%	100%	100%		87	100%	$3,960,927	87	

Formulas:

L7 = B7 + C7 + D7 + . . . + J7 + K7
M7 = L7/L2
N7 = (B7 * B2) + (C7 * C2) + (D7 * D2)+ . . . + (J7 * J2) + (K7 * K2)
Note: N7 ≠ M7 * N2
O7 = Number of entries in columns B through K of row 7
P7 = O7/L7

L3 = L4 + L5 + L6 . . . in the "Accounting" category
Formulas for M3 and N3 are similar to L3
L153 = L154 + L155 + L156
M153 = M 154 + M155 + M156 or L153/L2
N153 = N154 + N155 + N156
Note: O153 ≠ O154 + O155 + O156

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mation, including employees, major categories, activities, and departments. The activity dictionary at the end of this section was analyzed via a relational database and therefore lists codes, the numbering convention of which can be used as a model.

The database developed contains the following tables.

- *Department data table*: To evaluate more than one department within the defined unit, create a table that lists the department names and codes.
- *Employee data table*: This contains name, employee code, salary, and department code within the overall unit to which the employee belongs.
- *Activity data table*: This table contains each activity name, activity code, and major category code.
- *Data entry table*: This contains employee name (or code), activity codes, and each employee's time allocations from the data-collection forms.

Generate the following summary reports from either the spreadsheet or the database.

- Total amount of time and dollars spent on each discrete activity (ranked by either time or dollars)
- Total amount of time and dollars spent within each major category (ranked by either time or dollars)
- Ranking of activities based on fragmentation ratio

If the evaluation encompasses more than one department within one unit, also generate separate sets of the above reports for the data reported within each of the individual departments.

Interpreting the Results

A WDC analysis raises questions and points toward opportunities, rather than specifically offering solutions to problems and recommendations. This section suggests questions that can be answered through analysis of the WDC data. The case studies in the next chapter present several examples of charts and conclusions that were developed from the application of the WDC tool.

The reports generated above can help answer the following types of questions:

- Where should improvement efforts be focused?
  - What areas or processes will yield the most significant and noticeable benefits from improvement because they currently take up so much time or are so fragmented?
  - What activities "eat up" staff time?
  - What are the costs (in salaries and benefits) associated with each major category or activity? Are these costs reasonable given the importance of the activity?
- Are too many employees performing the same work?
  - Greater centralization of responsibilities may facilitate work.
  - When several employees are assigned the same task, considerable time is lost through interruptions and changeovers.
- Are the employees productive?
  - Comparatively large amounts of time for relatively simple groups of activities generally indicate low productivity for the unit.
  - Low productivity can be attributed to an imbalance of staff to workload or inadequate employee training.
- Are there misdirected efforts?
  - Is the time expended evenly matched to the importance of the activity?
    - If the activity being supported is unessential, the effort itself is misdirected.
  - Are the activities that take the most time really the most important ones?
  - Does the end result justify the person-hours expended?
- Are employee skills used effectively?
  - Working below skill level can create underutilization.
  - Working above skill level can increase errors and processing time.
  - Do higher-paid employees perform work that lower-paid employees could do if given the opportunity and training?
- Is the work evenly distributed?
  - Are only a few employees doing all the unit's critical work?
    - Is there adequate cross-training?
  - Does this uneven distribution create processing delays?

    This situation can lead to employee dissatisfaction.

- Is the work under- or over-specialized?
  - Employees with only a few activities entered on their WDC data-collection sheet indicate specialization.
    - Is this specialization appropriate for the skill mix of the unit?
    - Are there opportunities to increase cross-training?
  - Employees with many activities indicate that they are performing too many unrelated tasks, which can negatively affect the unit.
    - Efficiency and enthusiasm are hampered when employees are performing too many unrelated tasks.
    - Continual interruptions in changing from one type of work to another is costly, tiring to the employee, and will increase error rates.

These are a few of the questions that can help BPR team members think critically about the work they are analyzing. The team should add to these questions as necessary.

Concluding Comments

A work distribution chart facilitates a BPR effort by quantifying the time and costs associated with activities in a process or functional area. It is a powerful tool that provides objective, quantitative data. The data help management not only to identify and prioritize improvement opportunities but also to begin to build a case for change with upper administration, employees, and cross-functional areas by estimating time, costs, and potential savings associated with various activities. Over time, the WDC exercise can be repeated to measure progress in an objective, consistent manner.

Process Flowchart Analysis

Objectives and Overview

To create a process flowchart, the analyst follows a transaction (usually a piece of paper or a person) step-by-step to trace its path until the final output is created and delivered to the actual customer. Overall, the objective is to understand in detail how work gets done. As part of the analysis, data are collected regarding the activities, inputs, outputs, resources, costs, and value-added versus non-value-added nature of the process. The more detailed objectives in using this tool are to:

- identify the sequence of activities necessary to complete the transaction;
- identify the number and purpose of all the people and departments involved in a process;
- document these activities by creating a "map,"or diagram, that all parties understand and accept as the current process;
- quantify the time and dollars expended on each of these activities and on the entire process;
- assess the value-added versus non-value-added nature of these activities to identify ways to eliminate waste, save money, and redesign the process.

Creating process flowcharts is by far the most effective method for understanding workflow, eliminating unnecessary activities, and generating many improvement ideas. Developing a flowchart requires an understanding of every activity in a process and challenges an institution to strip away all but those steps essential for meeting customer expectations.

Suggested Use and Application

Creating process flowcharts involves two key issues: cross-functionality and level of detail. Cross-functionality means that a process is examined as it cuts across many departments within the institution, rather than examining the process within just one department. In determining the level of detail, the analyst can either document every discrete step or describe a very high-level process by grouping sets of related activities, depending on the purpose of the flowchart exercise.

In the context of BPR, the flowchart analysis should always be cross-functional, because focusing only on one department's segment of a process will yield incremental, rather than fundamental, results. For instance, the procurement process typically should include at least the following departments: the originating department, budget control, purchasing, receiving, and accounts payable. The greatest cost savings can be achieved only if the institutional managers are willing to break down boundaries between departments to develop new approaches for doing business.

Process flowcharts can be used either in great

detail or at a high level to serve two different purposes:

Application	Distinguishing Results
1) *Detailed.* Creating a chart of an entire, cross-functional process, where every detailed step and every possible path are charted.	This type of flowchart is needed for the detailed baseline and redesign phases of BPR. The detailed flowcharts should track all types of transactions that flow through the process. Costs and savings estimates based on the flowchart should be quite accurate. Estimates relating to non-value-added activities usually are precise and realistic.
2) *High Level:* Creating a chart of an entire, cross-functional process, where detailed steps are grouped together to focus on the "macro," most important activities of the process. All paths are not mapped; only those few paths that account for most of the transaction volume are followed and diagrammed.	The high-level flowchart is used at the beginning of a BPR effort to estimate high-level costs and savings. When the flowchart techniques are applied to several different high-level processes, the data will help the BPR team and management select the processes for redesign that have the greatest potential for improvement and cost savings. Data will not be useful for actual redesign, as they do not focus on detailed transaction flows.

Directions

Many different and equally effective techniques exist for building flowcharts. The technique below has been used effectively with more than 50 different colleges and universities and should be tailored to meet each institution's specific needs.

1) Begin by going into the departments where the work is actually done.

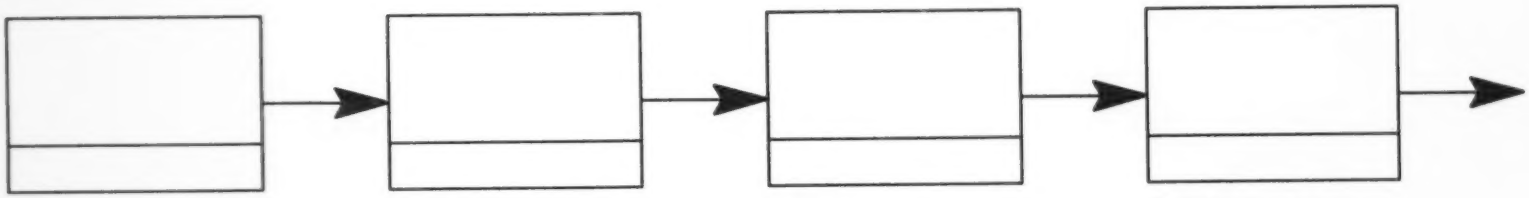
- Creating a flowchart is often called by another acronym, RBWA, which stands for routing by walking around. The analyst should "become" the transaction and should walk the entire process. It is useless to complete a flowchart while deskbound, or outside of the area where the work is actually done. Analysts must actually see the work and talk to the front-line employees who know the work the best and can provide excellent information and improvement ideas.

2) Observe the first activity and the physical flow of the paperwork and/or product.

- Exhibit 19 presents a flowchart data-collection template that captures the physical flow and the pertinent information about each activity.
  - This is a working-draft template that can be used later to create the final flowchart document for presentation purposes.
  - This form should be adapted to best meet individual needs.
  - Analysts will need to add "forking paths" above or below the existing flow on this template because many processes offer different routes for different types of transactions. Samples of processes with forking paths are shown later in the examples.
  - Large, blank flip-chart paper and small stick-on notepads are also effective in creating a flowchart while working with a large group of people. Each stickon note represents one activity and can, of course, be moved as discussion and the flowchart evolves.
- Working with the selected, knowledgeable department personnel, note the following key data for each activity:
  - The source of the input.
  - The typical minimum and maximum number of minutes an employee spends actually "touching" or working on the transaction in this activity (touch time).
  - The minimum and maximum number of days that the transaction may be delayed during this activity or between this activity and the next one (lag time). An example of lag time would be the number of days a form sits on someone's desk before it is actually picked up to be processed. Another example is the time a transaction spends in campus mail while going from one office to another.
  - The number of transactions (volume) that flow through this activity over a set period of time (usually one year).
  - The number of people who touch the transaction in this activity. This will almost always be "1," unless the transaction undergoes a committee or joint review at some point.
  - If the process flow "forks" after this activity, note the percent of transactions that

Exhibit 19.
Process Flowchart Template

Process _____



Touch____to _____
Lag_____to _____
NAV 0 25 50 75 100%
Volume _____

Touch____to _____
Lag_____to _____
NAV 0 25 50 75 100%
Volume _____

Touch____to _____
Lag_____to _____
NAV 0 25 50 75 100%
Volume _____

Touch____to _____
Lag_____to _____
NAV 0 25 50 75 100%
Volume _____

flow through each of the alternate paths (must sum to 100 percent).
  - Output of the activity.
  - Recipient of the output.
- Appendix B includes an example of a working-draft flowchart that has been completed using the template provided. The particular example is from the "Pay Invoice" portion of a cross-functional procurement process.

3) By identifying the output and the recipient of the output for the first activity, the analyst identified the next activity in the chain of this process. Repeat step 2 until the final output of the process has been delivered to the external customer.
4) Once the draft flowchart is completed, estimate the non-value-added (NVA) time, in increments of 25 percent, associated with each activity.

- Make these assessments away from the departmental personnel, who may resent any of their work being classified as NVA. Remember, it is not the person who is NVA, it is the activity. The employee can instead perform other, value-added work more effectively, and usually with greater satisfaction
- The concepts and specific examples of NVA activities are discussed in the section on the value-added/non-value-added assessment tool.
- If the flowchart is detailed down to the lowest level of activities, then most NVA estimates should be either 0 percent or 100 percent.
- On the other hand, if the chart is quite high level, analysts will need to exercise greater judgment in assessing whole groups of activities, and many activities will be only partially NVA. Usually, these assessments can be made in increments of 25 percent: that is, 0, 25, 50, 75, or 100 percent.
- Exhibit 20 presents a completed high-level flowchart for processing a personnel action form (PAF) that is used to change an employee's salary distribution at a medium-sized, public research university. Many of the boxes are shaded (representing NVA), indicating great potential for BPR and for increased use of technology.

5) Enter, aggregate, and analyze process flow data via a spreadsheet.

- The chart in exhibit 21 presents a sample format for a spreadsheet analysis. The activities and data presented correspond to the high-level flowchart in exhibit 20. For this discussion, columns are labeled A through N and rows are labeled 1 through 17, as noted on the chart.
- The activities that comprise this process are listed down column A. The data associated with each activity are arrayed across the activity's corresponding row. The data in columns B through H are drawn from the data collected on the flowchart template referenced earlier.
- The data in columns I through N are based on formulas that are listed at the bottom of the chart.
- Row 17 contains the column totals for the entire process.
- Exhibit 22 presents the summary-level process flow data. The numbers are derived from the data in exhibit 21. There are three calculations that require more detailed explanation.
  - The total "minimum" NVA percentage equals the minimum number of NVA minutes divided by the minimum touch-time minutes. Interestingly, in this case, this percentage is actually greater (88 percent) than the NVA percentage (83 percent), which was calculated using the maximum NVA minutes and the maximum touch-time minutes. In many cases, as the transaction becomes more complex, proportionately more time is required in the value-adding activities, and thus the overall NVA percentage decreases.
  - The average weighted salary per minute was drawn from the institution's payroll system and includes the benefits rate of 25 percent at this particular university. Alternatively, the analyst can obtain the salary of each person in the process and can match the correct salary per minute to each step of the process, as appropriate.
  - The formulas for cells B11, B12, and B13 are based on the "80/20 Rule." As a rule of thumb, 80 percent of the transactions are routine, will require close to the minimum number of processing minutes, and will experience the minimum lag days. On the other hand, roughly 20 percent of the transactions will be more complex, requiring greater resources and experiencing greater delays. Thus, the calculation is a weighted average that accounts for this 80/20 split to

Exhibit 20.
High-Level Process Flowchart for a Personnel Action Form (PAF)

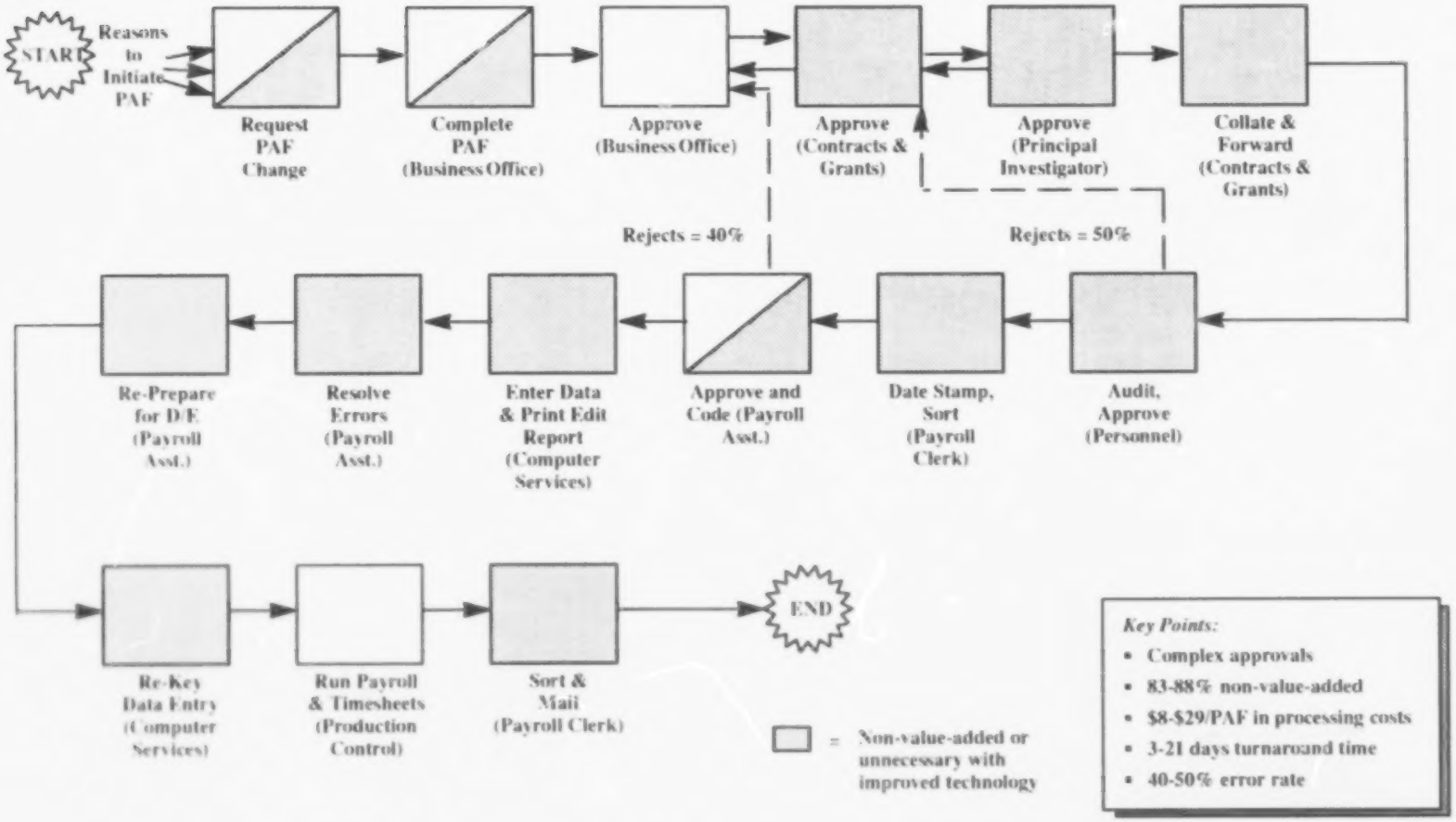

START
Reasons to Initiate PAF
Request PAF Change
Complete PAF (Business Office)
Approve (Business Office)
Approve (Contracts & Grants)
Approve (Principal Investigator)
Collate & Forward (Contracts & Grants)
Rejects = 40%
Rejects = 50%
Audit, Approve (Personnel)
Date Stamp, Sort (Payroll Clerk)
Approve and Code (Payroll Asst.)
Enter Data & Print Edit Report (Computer Services)
Resolve Errors (Payroll Asst.)
Re-Prepare for D/E (Payroll Asst.)
Re-Key Data Entry (Computer Services)
Run Payroll & Timesheets (Production Control)
Sort & Mail (Payroll Clerk)
END
= Non-value-added or unnecessary with improved technology
Key Points:
• Complex approvals
• 83-88% non-value-added
• $8-$29/PAF in processing costs
• 3-21 days turnaround time
• 40-50% error rate

Exhibit 21.
Sample Format for Process Flow Spreadsheet Analysis
Detailed Data and Calculations for PAF Processing

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	**Activity Description**	**Min. Touch Time (minutes)**	**Max. Touch Time (minutes)**	**Min. Lag Time (days)**	**Max. Lag Time (days)**	**NVA %**	**% Which Flow thru this Activity Path**	**# of People Who Touch Trans. in this Step**	**Weighted Min. Touch-Time (minutes)**	**Weighted Max. Touch-Time (minutes)**	**Weighted Min. Lag Time (days)**	**Weighted Max. Lag Time (days)**	**Min. NVA Touch-Time (minutes)**	**Max NVA Touch-Time (minutes)**
2	Send Note to Request PAF Change	1	3	0	1	50%	100%	1	1	3	0	1	0.5	1.5
3	Complete PAF	2	10	0	2.5	50%	100%	1	2	10	0	2.5	1	5
4	Approve by the Business Office	1	5	0	2.5	0%	100%	1	1	5	0	2.5	0	0
5	Approve by C&G Office	15	20	0.5	5	100%	100%	1	15	20	0.5	5	15	20
6	Approve by Principal Investigator	0.5	5	0.5	2	100%	100%	1	0.5	5	0.5	2	0.5	5
7	Collate and Forward to Personnel	1	5	0	2	100%	100%	1	1	5	0	2	1	5
8	Audit and Approve in Personnel	1	3	0.25	1	100%	100%	1	1	3	0.25	1	1	3
9	Date Stamp and Sort in Payroll	0.5	2	0.25	2	100%	100%	1	0.5	2	0.25	2	0.5	2
10	Approve and Code the PAF in Payroll	1	5	0	0.75	50%	100%	1	1	5	0	0.75	0.5	2.5
11	Enter Data & Print Edit Report in Computer Services	0.5	1	1	1	100%	100%	1	0.5	1	1	1	0.5	1
12	Resolve Errors in Payroll	0.5	40	0	0.25	100%	30%	2	0.3	24	0	0.075	0.3	24
13	Re-Prepare for Data Entry in Payroll	0.5	1	1	2	100%	30%	1	0.15	0.3	0.3	0.6	0.15	0.3
14	Re-Key Data Entry in Computer Services	0.5	1	1	1	100%	30%	1	0.15	0.3	0.3	0.3	0.15	0.3
15	Run Payroll & Timesheet Program in Production Control	0	0	0	0	0%	100%	0	0	0	0	0	0	0
16	Sort & Mail Updated PAFs in Payroll	0.25	0.5	1	2	100%	100%	1	0.25	0.5	1	2	0.25	0.5
17	**TOTALS for PAF Processing**								**24.35**	**84.1**	**4.1**	**22.73**	**21.35**	**70.1**

Formulas

I6 = B6 x G6 x H6
J6 = C6 x G6 x H6
K6 = D6 x G6
L6 = E6 x G6

M6 = J6 x F6
N6 = J6 x F6
I17 = sum (I2 : I16)
J17 = sum (J2 : J16)

The formulas for K17, L17, M17, and N17 are structured the same as the formulas for I 17 and J17.

= Totals are not applicable

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Exhibit 22.
Sample of Summary Level Process Flow Data and Calculations

	A	B
1	Weighted Minimum Touch-Time	24.35 minutes
2	Weighted Maximum Touch-Time	84.1 minutes
3	Weighted Minimum Lag Time	4.1 days
4	Weighted Maximum Lag Time	22.7 days
5	Total Minimum NVA %	88 percent
6	Total Maximum NVA %	83 percent
7	Assumed Average Salary plus Benefits per Minute	$0.34
8	Weighted Minimum Touch Costs	$8.28
9	Weighted Maximum Touch Costs	$28.59
10	**Summary:**	
11	Average Touch-Time per Transaction	36.3 minutes
12	Average Touch Costs per Transaction	$12.34
13	Average Lag Time per Transaction	7.8 days

Formulas

B1 = I17 from previous chart

B2 = J17 from previous chart

B3 = K17 from previous chart

B4 = L17 from previous chart

B5 = (M17/I17) from previous chart

B6 = (N17/I17) from previous chart

B7 = Estimate from institution's payroll system

B8 = B7 x B1

B9 = B7 x B2

B11 = (B1 x 0.8) + (B2 x 0.2)

B12 = (B8 x 0.8) + (B9 x 0.2)

B13 = (B3 x 0.8) + (B4 x 0.2)

estimate the overall average cost of processing one transaction.

Interpreting the Results

While working with departments to document a process, the analyst should consider the following types of questions and approaches. It is most important to challenge the "process owner," the person who has authority over the process and has the ability to implement changes.Analysts must not accept vague answers in justification of an age-old process. The purpose of the mapping exercise is to get to the heart of the work structure, not to justify the status quo. The mapping exercise questions the current process and begins to generate redesign ideas. It may be helpful to bring the following list of questions as a reference during the interviews and working sessions.

Issues associated with core work processes typically fall into the "M's of Management" categories: Manufacturing, Manpower, Material, Marketing, and Management. Questions relating to process flow analysis are listed in each of these categories below.

Manufacturing (the work process itself): These questions should be asked primarily of the employees, or "doers," themselves. For selected topics, such as control of the process, management may also offer valuable insight. In general, employees will know this area very well so that management time and attention can be focused on other areas of questioning.

- How is the work done? Manually? Electronically? In duplicate? Triplicate?
- Does the process seem overly complicated? Can it be performed more easily?
- Does the activity duplicate, either in whole or in part, work performed in other steps or areas?
- Does the activity record information that has been or will be recorded elsewhere?
- Does the activity require the employee to make a substantial new study of the information?
- Can the activity be coordinated and/or combined with another? How?
- How many inspection, storage, or transport activities are there? Why?
- Are control steps incorporated into each process to prevent and/or detect and correct errors, thereby reducing the institution's liability? What are these controls? What specific need does each address?
- When would an error be caught if each control step were eliminated?
- What would be the cost or consequences of an error or lapse in control? Is the control cost-justified?
- What are the error/reject rates? Why are transactions rejected or re-routed?
- What are the major bottlenecks/backlogs? Why?

Manpower (the staff members that do the work): These questions should be asked of the supervisors or managers. Some questions, if phrased in a nonthreatening way, can also be asked of astute employees themselves.

- Who is doing the work?
- Does the worker have the right skill mix?
- Is the worker adequately trained?
- Can a more junior or less-skilled person perform the activity if appropriately trained?
- Who else, regardless of his or her unit, can perform the activity most easily and practically?
- Can an employee be trained to complete a transaction from start to finish, without handing off to a colleague or a supervisor?

Materials (equipment, supplies, forms): These questions should be asked of both management and employees, who may offer different perspectives and insights.

- Should different forms or supplies be used?
- Is the proper equipment available? What new or different equipment could help employees perform this process better?
- Can mechanical shortcuts be adopted?
- Does the unit have the technology it needs to perform this process?

Marketing (the customer):These questions should be asked of management, employees, and even customers, if possible.

- What is the purpose of this process from the customer's perspective?
- Does the process fulfill the purpose?
- Has the unit communicated with its customers to ensure that the output is what the customers want?

- Has the unit communicated with its customers to determine priorities in output and opportunities for improvement?
- Is each activity essential to the final output for the customer?
- When and how does the customer interface with the process?
  - Should this be done earlier or later?
  - Should there be more or fewer interactions?
  - Should interactions be simplified?
  - Can the interactions be automated to speed processing and service delivery?

Management: These questions should be asked of both the supervisors/managers and the employees themselves. Answers should be compared on a general, not individual, basis. Of course, questions should be phrased appropriately for each interviewee.

- Has management documented policies and procedures to help employees execute this process?
- Do specific institutional policies inhibit efficiency?
- Do employees have the proper responsibility, accountability, and authority? Are these linked in a manner that empowers employees to make appropriate decisions and take appropriate actions?
- Is the work properly distributed among employees throughout the process?
- What systems are in place to measure output and performance in terms of quality and importance to the customer?
- Are performance measurements based on processes, teamwork, and customer satisfaction?
- Does management over-control or ignore the process?
- Do the conflicting goals of, or a lack of communication among, area managers throughout this process inhibit efficiency?

Concluding Comments

Creating a process flowchart is one of the most frequently used tools in BPR. Flowcharts help analysts in three important ways: understanding the current process, generating ideas to redesign the process, and implementing the new process using a flowchart of the redesign. Developing the process map leads BPR team members to question why tasks are done the way they are done, and whether certain tasks should be done at all.

Overall, the fundamental purpose of this tool is to identify and then quantify activities, inputs, outputs, resources, costs, and VA/NVA tasks. In meeting this purpose, use of the process flowcharts not only becomes an integral part of the BPR process, it also establishes performance measurements to monitor the new process results going forward.

Cost of Quality Analysis

Objectives and Overview

The cost of quality is the total cost for not doing it right the first time. These costs include time and money spent on learning how to do it right, checking that it is right, or fixing the mistakes.[5] COQ analysis is based on the same principles as VA/NVA assessment and is used to distinguish between those activities[6] that are essential (from the customer's perspective) and those that are not essential and thus should be minimized or eliminated from the process over time. Like VA/NVA, COQ analysis is used with other BPR tools to analyze data. While VA/NVA assessment is an extremely useful tool, COQ is even more powerful because it classifies each NVA activity as contributing to one of four types of costs: prevention, appraisal, internal failures, or external failures (defined later). Using COQ analysis to build on VA/NVA assessment results in the following benefits:

- types of NVA activities are more thoroughly understood, which focuses the BPR team more clearly on major, related topics for improvement;
- BPR teams can more clearly identify the potential reasons why poor quality occurs, or why a particular process is expensive;
- savings can be more reliably estimated because estimates are developed for each COQ category, rather than all NVA activities as one group.

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5. David K. Carr, and Ian D. Littman, *Excellence in Government: Total Quality Management in the 1990's* in the Coopers & Lybrand Performance Solutions Series (Fredericksburg, VA: Coopers & Lybrand, 1990), pp. 219–220.
6. The terms "activity" and "step" are interchangeable.

Thus, while the objectives of both COQ and VA/NVA analyses are to identify waste and estimate savings, COQ allows the BPR team to achieve these goals more thoroughly and accurately.

Suggested Use and Application

Like NVA assessment, cost of quality analysis is used in conjunction with work distribution analysis or process flowchart analysis, and can focus on the activities which comprise a process or a unit.[7]

Application	Distinguishing Results
To *process analysis*, where discrete steps in a detailed process flow are classified according to the COQ categories (used with either the Work Distribution Analysis or Process Flow Charting Analysis).	Data will center on the costs of the activities which are part of a particular cross-functional process. Cost savings will be achieved through cross-functional improvement efforts.
To *activity analysis of an entire unit*, where each activity in that unit's operation is classified according to the COQ categories (used with Work Distribution Analysis).	Data and analyses will focus on an entire unit. Costs and savings will be estimated based on the unit's internal improvement activities only, although ability to achieve improvements may rest with managers outside the particular unit.

How does one choose between simply using VA/NVA assessment or using the more complex COQ analysis? When applying either work distribution chart analysis or working with process flowcharts at a high level, simple VA/NVA assessment will suffice. At such a high level, it would be difficult to classify activities into just one COQ category. However, when doing detailed flowchart or work distribution analysis, activities will be listed in such detail that they naturally either will be value-added or will fall into one of the COQ categories. Thus, in this case, COQ should be employed instead of VA/NVA assessment. The results will be more powerful and cost estimates more accurate.

COQ is applied to an entire process using the work distribution chart analysis described earlier in this chapter; thus, a detailed example should be more illustrative. These concepts, directions, data templates, and analyses can be applied equally when using process flowcharts.

Directions

Please complete the six steps of the work distribution chart analysis.

When creating the list of activities in step 1 of the WDC procedures, ensure that all activities are either value-added or, if non-value-added, can be classified into only one of the following four COQ categories discussed below.[8]

- **Prevention Costs**: These are the cost of preventing problems and eliminating errors at the source, including the costs of training and awareness programs, developing manuals or procedures, analyzing data, conducting customer workshops or special improvement projects, or planning quality efforts. This aspect of COQ is *positive*. Organizations typically do not spend enough time and money on these types of activities, which causes the other costs of quality to increase unnecessarily. As a department improves, the prevention costs typically increase while other costs of quality decrease.
- **Appraisal Costs**: These encompass the cost of inspecting for errors or for inspecting the quality of the output, including proofreading, key verification, reconciliations, or vendor/third party audits. As a rule of thumb, usually 30 percent of these costs can be eliminated through process redesign.
- **Internal Failure Costs**: The costs of redoing work, delays, requests for special handling, and other forms of waste, poor design, or redundant work. This may include error research and analysis, error corrections, document and data replacement, reinspection, idle time, moving from one desk to another, batching forms for data entry, sorting, completing a summary document for a batch of forms for data entry, or any redundant steps. As a rule of thumb,

7. A "unit" is usually comprised of one department. However, WDC analysis could be used to analyze groups of departments which comprise a larger administrative unit, such as a "Division" (e.g., division of administrative services), vice-presidential area (e.g., vice president for finance and administration), or the entire administration (e.g., for a small independent college or small college within a larger university).

8. Carr and Littman, pp. 219–220.

usually 50 percent of these costs can be eliminated.

- **External Failure Costs**: The costs of any reworking after the "output" is delivered to the customer, including complaint investigation and response, adjustments, compensatory work, or formal investigations. As a rule of thumb, 100 percent of these costs should be eliminated.

The graphic in exhibit 23 illustrates the desired progression of COQ as a department improves its operations and efficiency. Most organizations begin with an initial COQ of 20 to 40 percent of total expenditures, with the majority of costs stemming from internal failures. Effective organizations typically have costs of quality at or below 10 percent of total expenditures, and these costs of quality emphasize prevention.

7) Now that the six WDC steps have been completed, it is possible to take an extra step and classify each activity by COQ category and capture that activity's cost in the appropriate COQ category.

As discussed in the WDC analysis section, activities can be analyzed with a spreadsheet or a relational database. The WDC section of this chapter outlined the method used to calculate costs associated with each activity. In this COQ step, analysts should enhance that spreadsheet or database by capturing each activity's costs in the appropriate COQ category.

Spreadsheet:

The spreadsheet example in exhibit 24 provides a method by which to categorize, calculate, and analyze COQ activity costs. The formulas for each cell are listed at the bottom of the exhibit. Briefly,

- The COQ categories are arrayed across the top of the spreadsheet in columns AM through AP; the value-added category is in column AL.
- The total staff costs for each activity (from column AK) are allocated to one of the columns AL through AP, according to the definitions presented earlier in this text.
- Row 2 of columns AL through AP contains the sums of the costs listed down each column.
- Row 3 of columns AL through AP contains the sums of the costs in each column as a percent of the total cost (total cost is listed in cell AK2).

Relational Database:

To the database tables discussed in the WDC section, add the COQ category for each activity listed in the "activity data table." Thus the activity data table will contain the activity name, activity code, major category code, and COQ category.

Also, generate an additional report that lists the total costs for each COQ category, as well as the total costs for each COQ category as a percent of total costs.

Interpreting the Results

This section suggests questions to consider in analyzing COQ data. The case studies in the next chapter present actual examples of applying COQ analysis, with sample charts and conclusions.

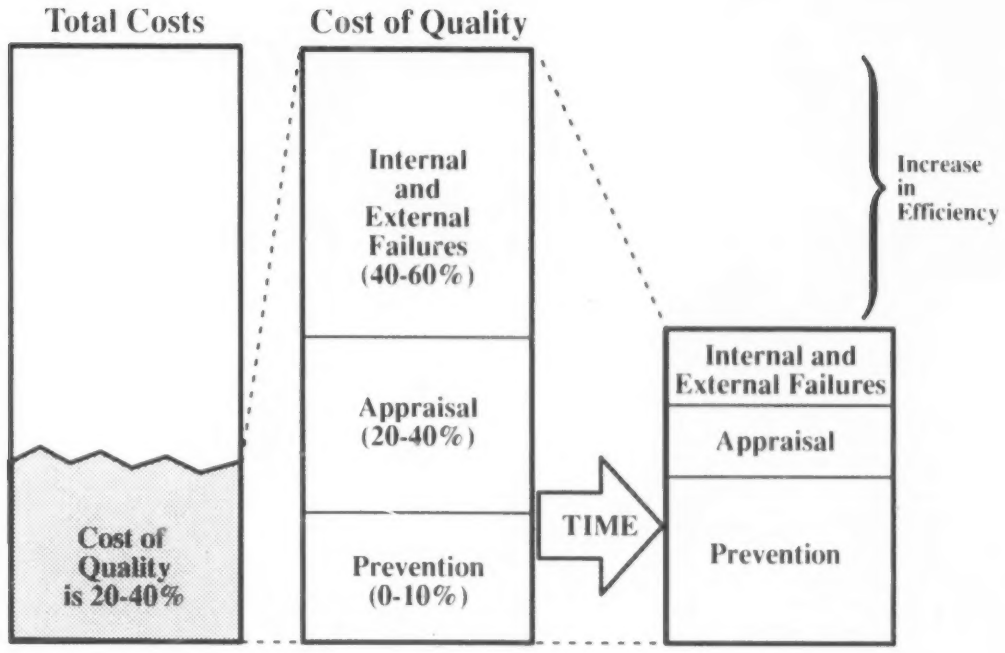
Overall Questions:

- What percentages of staff time and costs are allocated to value-added versus non-value-added activities?
- What is the balance of costs among the four COQ categories?
- Does the institution need to shift the balance of quality control activities so that it spends more time on up-front error prevention, rather than on inspection or rework?
- Assuming, as a rule of thumb, that 100 percent of external failure costs, 50 percent of internal failure costs, and 30 percent of appraisal costs can be eliminated, what are the potential cost savings?

Prevention:

- Given the costs of various prevention activities, are the programs effective?
- Does customer or employee feedback confirm the effectiveness and importance of efforts in this category?
- Which prevention programs should be phased out, maintained, or increased?
- Given the other costs of quality throughout the operation, where should training be improved?
- What prevention programs can be developed to

Exhibit 23.
Desired Progression of COQ



Sources: American Society of Quality Control and National Association of Accountants

Exhibit 24.
Sample Format for COQ Spreadsheet Analysis

Employee Data Responses

		B	C	D	E	F	G		AJ	AK	AL	AM	AN	AO	AP
1	Activities	Director	Assistant Director	Purchase Officer	Buyer 1	Buyer 2	Clerk 1		% of Total Dept. Time	Total Staff Costs	Value-Added Activity	COQ Prevention	COQ Appraisal	COQ Internal Failure	COQ External Failure
2	**Salaries**	$72,800	$52,500	$45,150	$33,870	$36,440	$22,280	...	100%	$1,402,361	$339,039	$316,467	$150,182	$468,659	$128,014
3	Processing low-value POs										24%	23%	11%	33%	10%
4	Date stamp requisitions								0.25%	$3,248				$3,248	
5	Initial review and "red flag"	2%		2%					0.5%	$6,177			$6,177		
6	Log in on tracking system			2%					1%	$11,871				$11,871	
7	Sort and distribute requisitions			5%					1%	$7,633				$7,633	
8	Buyer review for price & source			10%	13%	3%			4%	$62,406	$62,406				
9	Obtain additional documentation				5%	3%			2%	$23,639				$23,639	
10	Send rejected reqs. back to dept.				1%	3%			0.5%	$3,855					$3,855
11	Obtain informal quotes			5%	11%	5%			3%	$43,789	$43,789				
12	Complete purchase order			2%	13%	3%			4%	$53,621	$53,621				
13	Type terms on P.O.						57%		5%	$37,002				$37,002	
14	Sign P.O. by approp. level	2%	7%						1%	$16,091			$16,091		
15	Burst & distribute forms						29%		2%	$16,177				$16,177	
16	Mail to vendor						11%		1%	$8,823	$8,823				
17	Count requisitions								1%	$5,672				$5,672	
18	Log out PO on system								1%	$8,593				$8,593	
19	File copy								0.5%	$4,656				$4,656	
161	Resolve Cust./Dept. complaints	5%	2%		2%	2%			3%	$46,229					$46,229
162	Contact vendors to resolve complaints	5%	2%		2%	2%		...	4%	$47,931					$47,931
163	Establish & negotiate contracts			7%	2%				3%	$41,118	$41,118				
164	Conduct training workshops		4%		1%	1%			0.5%	$8,366		$8,366			
165	Gather & analyze statistical data	2%	2%		2%	2%			1%	$16,773		$16,773			

*Numbers may not sum due to rounding.

Formulas:

AJ7 = B7 + C7 + . . . + AI7

AK7 = (B7 * B2) + (C7 * C2) + . . . + (AI7 * AI2)

AK2 = B2 + B3 + . . . + AI3

AL2 = Sum of column AL beginning with cell AL4.
Formulas for AM2, AN2, AO2 and AP2 are similar to AL2

AL3 = AL2/AK2
Formulas for AM2, AN2, AO2 and AP2 are similar to AL3
See WDC Spreadsheet Analysis Exhibit for more formulas

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help reduce the greatest causes of COQ in appraisals, internal failures, or external failures?

Appraisals:

- What are the major types of appraisal costs? How many errors are there in each category over the course of a year?
- If there are numerous approvals, what purpose do they serve and how can they be reduced?
  - Were the approvals originally mandated by university policies that may need to be reevaluated?
  - Were the approvals instituted in response to high error rates? Can the source of the errors be eliminated, rather than inspecting for errors after the fact?
  - Are the approvals historically just part of the process; that is, does anybody know or remember why the approvals are required?
- Do approvals link responsibility, authority, and accountability with the goal of minimizing the number of required approvals?
- Do the approvals control *access to information*, rather than *identified risks*?
  - Can distributed access to information systems eliminate the need for these approvals?
- Can technology be better employed to reduce the need for inspections and approvals?

Internal Failures:

- What are the major types of internal failures? How many occurrences are there in each category over the course of a year?
- What causes these internal failures? How can they be eliminated?
- How can the operation be redesigned to eliminate the internal failures that seem to occur regularly as part of the "normal" process? (See also questions under process flowchart analysis related to this topic.)
- Can employees be trained and empowered to complete a transaction from start to finish without passing the transaction down a "multi-stop production line?" These types of hand-offs increase error rates.
- Can technology be better utilized to reduce internal failures, such as moves, batching, coding, key-punching, filing, or sorting?

External Failures:

- What are the major types of external failures? How many occurrences are there in each category over the course of a year?
- What causes these failures? How can the process be redesigned to eliminate these failures?
- What is the customer reaction to external failures?
- What are the repercussions within the university resulting from each external failure?
- What costs are expended to respond to each customer complaint/external failure (other than university staff time expended to address the problem)?

Concluding Comments

Combined with a work distribution chart or process flowchart, cost of quality analysis presents powerful data. It focuses the organization on the types of poor quality that are driving up costs. It also helps the institution realign its costs of quality expenditures to "do the activity right the first time."

Ferreting out the hidden costs of quality in any organization is difficult because this type of data is not routinely collected. Establishing these costs requires careful review of how people spend their time and direct observation of how work is done. A word of caution: during the first few years that an organization performs cost of quality analysis, the results may look progressively worse. This does not mean that the institution's improvement effort is failing. The institution is simply becoming better at capturing the hidden information on costs of quality. This is progress, not backsliding.

Ultimately, however, the institution will reduce its overall costs of quality as processes are streamlined and COQ expenditures are strategically targeted in the prevention category.

Volume Analysis

Objectives and Overview

The objective of volume analysis is to understand the different types and numbers of transactions that flow through a process. Volume analysis is used to:

- Compare the number of transactions to the number of staff members over time to assess how workload might reasonably be changed in the future.
- Analyze the variety of transaction types and corresponding volumes in order to determine whether the process is overly segmented and specialized.
- Compare the volume of transactions by type to the dollar value (or other exposure to risk) of those transactions to evaluate the necessity of the approvals required for the various transaction types.
- Help determine the optimal approval requirements based on transaction types and exposure to risk.
- Identify the transaction types that account for the bulk of the work volume and that therefore would yield the most benefit from improvement.
- Assess the effects on volume, workload, or processing resulting from changes in staffing levels, policies, procedures, or systems.

Hence, volume analysis can be used to gain a deeper understanding of many aspects of a current process or to project effects of potential changes. Unlike the previous tools that drive broad redesign efforts, this tool allows the analyst to delve further into a particular issue, such as workload, approval structures, or processing options.

Suggested Use and Application

Volume analysis can be applied in two different ways. One approach to volume analysis focuses on the transactions, classifying them by different types and analyzing their volume through the process. The other approach to volume analysis focuses on transaction volume per employee, thereby measuring workload over time.

Application	Distinguishing Results
1) By focusing on transaction types, volume analysis quantifies each transaction type through the process. Types can be determined by dollar value, priority, complexity, purpose, etc.	This method is effective for developing new approval structures and other institutional policies. It helps focus improvement efforts on the transactions that consume the most staff time.
2) The second approach to volume analysis focuses on transaction volume with respect to staffing levels over time as a measure of employee workload.	This helps to build a case for fundamental change in the process. At most institutions, volume analysis will show significantly increasing workloads over the last five to ten years.

Please note that the authors do not propose using volume analysis to determine actual staffing levels in administrative processing areas. More traditional operations improvement efforts typically focus on employee productivity, tightened work standards, daily performance reports, or other incremental efficiency improvements. BPR focuses on radical redesign of the processes and the way work is done. Once processes are rationalized and redesigned, staffing requirements should certainly decrease across the organization. However, BPR typically does not utilize strict volume and productivity measurements in order to determine specific staffing requirements.

Directions

Volume analysis can be applied in two ways: by analyzing the number of transactions that flow through specified categories or by analyzing transaction volumes as an indicator of workload. The directions for each type of analysis are described separately below, and each has its own "interpreting the results" section.

Analysis of the Volume of Transactions Within Specified Categories

1) Determine the criteria to differentiate among various transaction types.

- Many of higher education's high-volume, "business" processes support financial transactions. Therefore, in many cases, transactions can be segmented by financial value. For instance, when analyzing a procurement process, the transactions (i.e., purchase orders) may be classified based on dollar value—less than $300, between $301 and $1,000, between $1,000 and $2,500, and so on. These classifications should mimic the way transactions are actually segmented in the process. For instance, purchase orders under $300 may be "quick orders." Purchases over $2,500 may require competitive written bids and therefore may demand different handling.

Other criteria used to segment transaction types may include priority, complexity, purpose, originating department, vendor type, type of student (undergraduate/graduate), school (business, engineering, law, etc.), year of the student (freshman, sophomore, etc.), or type of employee (staff, faculty, union, etc.). The categories must be developed to meet the exact needs of each independent analysis.

2) Collect the volume data for each transaction type.

- The analyst needs to determine how many transactions occurred in each of the defined categories (usually over the course of a year). For instance, he or she needs to determine the number of purchase orders issued for less than $300, as opposed to the other categories. Unfortunately, many institutions are data rich and information poor. Therefore, collecting transaction data according to specified categories (thus transforming mere data into meaningful information) may prove challenging. It is important to be creative both in source and method. For instance, the purchasing department may not have the information systems to track the number of purchase orders in specific dollar value categories; however, accounts payable may be able to list the number of checks cut by specified dollar value ranges, thereby providing similar, if not exactly perfect, information.
- In addition to using a variety of information sources, it is important to be flexible in data-collection methods. One hundred percent sampling is not required. For instance, extrapolate data from one or a few departments to estimate the total transaction volume. Alternatively, create the data by physically observing a random sample of transactions and extrapolating to approximate the total annual volume. If necessary and reasonable, change the category types to better fit the available data. Absolute precision is not important—just reasonable approximations.

3) Correlate the transaction volumes to the "dollars" associated with each transaction type.

To analyze transaction volumes, they must be compared against something. In this first case, transaction volumes are compared to the dollars associated with those transactions. Later, the number of transactions is compared to staffing levels as a measure of workload. The term "dollars" can mean the dollar value of the transactions or, alternatively, the costs of processing those transactions.

- **Dollar Value of the Transactions:** In this case, using the same categories that were used to segment transaction types, identify the total dollar value of the transactions in each category. For instance, in accounts payable, one category might include checks between $1,000 and $5,000. There may be 4,796 checks cut in this category over the course of a year. The total dollar value of the 4,796 checks might be $17,719,000, dispersed to a wide range of vendors.
- **Cost of Processing the Transactions:** In this case, again using the same categories for transaction types, the cost of processing one transaction[9] of a particular type is multiplied by the number of transactions in that type over the course of a year. This multiplication product is the total annual costs, universitywide, of processing all transactions of that type through the process.

With both the volume data and the dollar data, it is possible to analyze the transactions and draw conclusions about the appropriate categories.

Interpreting the Results

- For purposes of analysis, the analyst should convert all data from absolute numbers into percentages. For instance, instead of denoting that there are 4,796 transactions of type "A," record that type "A" transactions account for 27 percent of the total transaction volume through the particular process. Furthermore, instead of recording that type A transactions, in aggregate, cost $231,700 per year in staff processing dollars, record that the costs of processing type A transactions account for 47 percent of the total processing costs for all transactions (types A through G, hypothetically) that flow through this process. Lastly, calculate the $17,719,000 that these checks represent as a percentage of the total dollars disbursed by the accounts payable department.

9. The cost of processing one transaction can be calculated using Process Flowcharting Analysis or Work Distribution Chart Analysis.

- Graph the results for comparison. The charts in exhibit 25 are samples of the types of graphs that can be created for this analysis. Each chart presents a different "cut" of the same process' data using different boundaries for the transaction types, which are based on the dollar value of each individual transaction. The white bars show the percent of the *total dollar value* of all invoices which is composed of the invoices in each specified range. The shaded bars depict the percent of the *total number of invoices* which is composed of the invoices in the specified range. In this case, the invoice data was used to approximate purchase order activity, as purchase order data was unavailable.

  The left chart shows that 93 percent of all invoices (and thus probably purchase orders as well) are less than $900, yet these purchases account for just 11 percent of the total dollars expended. The chart indicates that this institution may want to consider raising its quick order dollar limit from $300 to at least $900. This change would need to be accompanied by appropriate training of decentralized departmental staff, random audits, and meaningful, swift consequences in cases of abuse. The right chart shows that if this institution raised its competitive bid requirement from the current $2,500 to $15,000, nearly three quarters of the dollars spent on purchases would still undergo a bid process. The $15,000 limit may seem high to some institutions, but senior management may want to accept a calculated level of risk to simplify and reduce processing costs.
- The graphs can help to answer the following types of questions:
  - Are transactions appropriately segmented?
    - Do too many transactions fall into one category?
      - If so, can the transactions be more appropriately segmented and balanced?
      - Can the processing in the high-volume categories be especially streamlined to ease workload?
    - For improved analysis, should categories be narrowed further?
    - Does the institution overspecialize transaction types? Can transactions be made more generic and therefore simpler to process?
  - Are approval levels appropriate?
    - Is the institution spending a disproportionate amount of staff costs controlling a low percentage of the total transactional dollar value?
    - If approval limits were relaxed, what additional total transactional dollar value would be exposed to increased risk?
    - What percentage of the total transactional dollar value needs to be controlled at the highest level, with the highest level of approval?
    - Conversely, what percentage of the total transactional dollar value can be subject to the lowest controls, with the lowest level of approval?
  - What transaction types consume the greatest staff resources?
    - How can the processing of this transaction type be simplified?

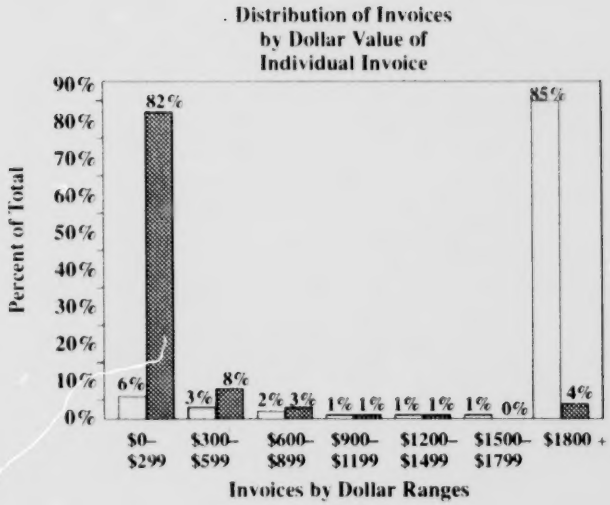
Volume Analysis of Employee Workload

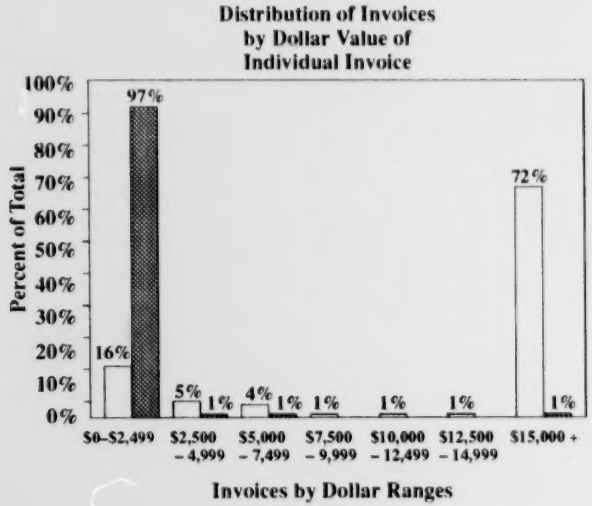
This section presents an approach to analyzing changes in transaction volumes as an indicator of employee workload.[10]

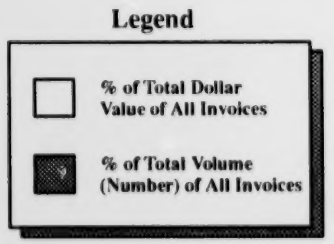
1) As explained above, determine the criteria to differentiate among various transaction types.
   - Transaction types can be aggregated into larger groups than in the previous analysis. For instance, it is not necessary to differentiate among purchase orders under $300, between $301 and $600, between $601 and $900, etc., as was done in the previous exhibit. Simply differentiate among transactions that require significantly different processing time. For instance, distinguish between "quick" purchase orders (speed processing under $300); regular purchase orders (non-bid orders less than $2,500); and purchase orders that require a written competitive bid (over $ 2,500).
2) Collect the volume data for each transaction type over the designated time period.

10. Please note that workload is not defined simply one-dimensionally by volume. The work required per transaction in each department may vary tremendously. However, volume can be one initial measurement evaluated as a "red flag" and then further investigated to understand the processing and workload issues.

Exhibit 25.
Sample Graphs for Volume Analysis Focusing on Transaction Types







- Data should be collected for at least a five-year period; 10 years is even better.
- If over a 10-year period, data can be collected for every other year.

3) Collect data for the total number of FTE staff allocated to processing these transactions over the same time periods.
- If possible, identify the number of FTE staff allocated to processing each type of transaction. Otherwise, use the total number of FTE employees who work on any type of transaction.
- Collect the FTE staffing data from each department that touches the particular process and has staff members allocated to work on these transactions.

Interpreting the Results

- Divide the transaction volumes by the FTE staffing numbers to determine the volume processed per employee. This figure is called "workload."
- Graph the workload over time. Exhibit 26 presents a sample graph created using volume analysis. In this case, transactions were segmented by the type of facilities-related work: custodial, grounds, or maintenance. Transactions corresponded to the total square footage or the acreage maintained by the employees. This type of graph is primarily used to help build a case for change. If the workload increases over time, the steepness of the slope will indicate how much the department is "hurting" in terms of increasing workload and backlog. Additionally, these graphs can help to answer the following types of questions:
  - For each process, what departments appear to be shouldering greater workloads?
  - Can workload be shifted to other departments that may have greater flexibility?
  - Are processing bottlenecks occurring in this department? Why?
  - Does workload swing dramatically up and down over time? Why?
  - Do inconsistent staffing levels cause processing issues?
  - Is volume seasonal? If so, can cross-training be implemented to improve the consistency of workload among departments and across transaction types?
  - Is there a gradual workload "creep" or decline? If so, is this planned or is it an accidental occurrence that could cause problems in the future?
  - If systems or policy changes have been implemented over the evaluated time period, what was the effect on volume and workload? Was this expected? Have staffing levels been adjusted to compensate for the changes?

These are just a few of the issues BPR teams should consider when evaluating volume with respect to workload. The particular operating context for the process will raise many other questions. One of the many benefits of using university staff members on BPR teams is that they usually are aware of extenuating circumstances and thus should be able to offer clear insight into these analyses.

Concluding Comments

Both types of volume analysis are based on straightforward data and simple analytical concepts, yet they contribute to a cogent argument for change. When combined with other tools, especially using process flowcharts and benchmarking, the data come to life and can be presented in easy-to-understand, visually appealing formats. Depending upon the application, the data provide insight on transaction "over-segmentation"; approval requirements; effects of staffing, policy, or technology changes; the resource-consuming transaction types; and the urgency of the need for change. Furthermore, this volume analysis is also appealing because, over time, it can be augmented with additional years of data without redoing the original data collection and analysis.

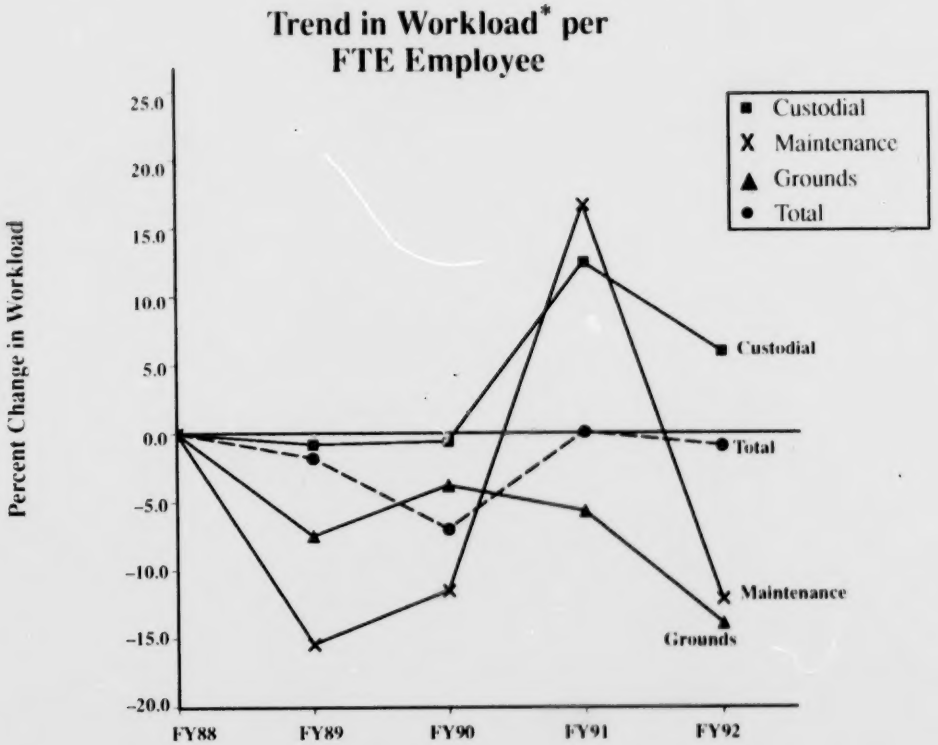
Benchmarking[11]

Objectives and Overview

Benchmarking is an ongoing, systematic process for measuring and comparing the work proc-

11. This section is based largely on two works which are excellent resources for benchmarking theory, case studies, and data. The first is *Benchmarking: A Tool for Continuous Improvement* in the Coopers & Lybrand Performance Solutions Series by C.J. McNair and Kathleen H.J. Leibfried (Harper Business: 1992). The second source is the NACUBO and Coopers & Lybrand Benchmarking Project: *Operational Benchmarking of Administrative and Business Costs in Higher Education Final Report, FY 1991.*

Exhibit 26.
Sample of Volume Analysis Focusing on Changes over Time



* *Workload is defined as total square feet or acres maintained. Base Year for Comparison is Fiscal Year 1988.*

Source: Volume Analysis

esses of one institution to those of other institutions. Benchmarking is a powerful tool that can be used to identify opportunities for improvement and to identify new ideas that others have proven to be successful and that may be adapted to improve operations. More specifically, benchmarking is used to:

- Measure and understand existing internal processes, functions, or operations.
- Identify other institutions, or even companies, for comparison (both within and outside higher education).
- Identify "best-in-class" performers from whom the institution can learn.
- Understand what results others have attained and how they have done so.
- Provide the basis for prioritizing opportunities for change, identifying those areas that would most benefit from redesign.
- Measure and understand improvements over time, with respect to initial internal measurements as well as other benchmarked institutions.
- Provide compelling evidence that change must occur, overcoming the natural resistance to change.

Most importantly, the ultimate objective of benchmarking is to generate action: some form of improvement and redesign. To benchmark, and to conduct BPR, is to explicitly decide that the organization is going to change.

Suggested Use and Application

Benchmarking can be applied in numerous ways under a variety of circumstances. To shape any benchmarking effort, management must first consider two decisions: the focus of benchmarking and the type of benchmarking.

Focus of Benchmarking

Benchmarking can focus on three aspects of any organization: outputs, processes, or strategic issues.

Application	Distinguishing Results
1) Outputs: Focuses on what a person or function does for the organization. Evaluates the services or products provided either to end-customers or to other parts of the organization.	Using this method, the analyst attempts to answer the question, "Are we doing the right things?" This focus will identify gaps in service capabilities as compared to customer's expectations or peers' performance.
2) Processes: Focuses on *how* the services are delivered or the work is performed.	This benchmarking attempts to answer the question, "Are we doing things right?" It targets processes for reduction or elimination that are using excessive resources with questionable value creation.
3) Strategic Issues: Focuses on the one- to five-year plan for the organization. Evaluates goals, new projects, and new ventures.	This benchmarking focus can be used to gain information to prioritize competing projects and to establish an overall plan to meet customer needs in the long term.

Business process redesign most frequently utilizes the first two categories of benchmarking (focusing on outputs and processes) to evaluate and redesign processes. These two categories of benchmarking are used because, in undertaking BPR, a college or university wants to ensure delivery of the right services (outputs) in the best way (processes). However, BPR must also occur within the context of a strategic direction—the "vision" discussed earlier in chapter II. Thus, to help shape an initial BPR effort, the institution may want also to benchmark strategic issues to stimulate ideas for new and innovative approaches to managing an institution.

Type of Benchmarking

In addition to determining the focus of the benchmarking effort, management must also choose among four types of benchmarking: internal, competitive, industry, and best-in-class. Each type is described below.

Application	Distinguishing Results
1) **Internal:** Analysis of existing, internal practices within various departments or divisions of the institution, looking for the best internal performance, and measuring current performance.	This is the first step in a benchmarking effort. The organization examines and understands itself before looking outward. Many improvements can be achieved by: • Challenging history and asking in regard to each activity: "Why do we do this?" and "Why do we do it in this manner?" • Raising the performance levels of all internal processes to the level of the best internal process

	• Setting goals and measuring internal improvements over time.
2) **Competitive:** Analysis of and comparison to targeted data from a select few, direct competitors or peers.	Competitive benchmarking is the next level of benchmarking but still reflects a fairly narrow, although important, view of benchmarking. This type of benchmarking can help an institution identify and prioritize areas for future improvement efforts by identifying major gaps in performance as compared to a select group of peers.
3) **Industry:** Analysis of and comparison to general trends across a much larger group of related institutions. Very closely parallels "competitive benchmarking" but implies a broader perspective.	More than simply prioritizing opportunities for improvement, this type of benchmarking can be used to establish performance improvement goals and to identify trends in the overall industry. This implies an expanded institutional goal to go beyond "being as good as the peers" by incorporating broad industry knowledge to implement cost-effective processes.
4) **Best-in-Class:** Looks across multiple industries in search of new, innovative ways to conduct business, no matter what their source.	This is the ultimate goal of the benchmarking process. This type of benchmarking supports "quantum leaps" in performance improvements and will lead to the greatest long-run competitive advantage.

Benchmarking must always begin with an internal assessment to understand an institution's own operations. An institution may choose to expand the initial internal assessment of one isolated process into a full-blown internal benchmarking analysis of the many other processes within the organization. Or, the institution may choose to assess internally the isolated process and then use any of the other three types of benchmarking for further analysis of the particular process. In this light, several of the case studies also use competitive benchmarking. Higher education, as an industry, is relatively new to benchmarking and has historically collected data only from selected, closely related peers (competitive benchmarking). The NACUBO/Coopers & Lybrand Benchmarking Project, discussed in more detail later as well as in this book's preface, advances these efforts by collecting data from almost 300 institutions regarding work processes in 40 functional areas. Eventually, of course, the challenge will be for institutions to compare themselves even more broadly, ultimately looking for the best ideas across a variety of industries.

Directions

As part of the improvement cycle, each benchmarking effort moves through a series of four phases, the steps of which are outlined in exhibit 27. The most important aspects of each phase are discussed below.

Phase 1: Understand Current Process

An institution must first understand and measure how work is currently performed before comparing its performance to others. This process is often called "baselining," or taking a snapshot of the "as-is" operation. Evaluating current internal performance will help to identify the areas that seem the most deficient and the most likely to benefit from external benchmark comparisons and redesign. Undergoing this type of self-analysis can provide a form of learning in and of itself. Very seldom does an institution look at how it does its work in such detail. The heart of this phase is deciding what to measure, measuring it, and then identifying opportunities, as discussed below.

- In deciding what to measure in Phase 1 of benchmarking, early studies may be confined to the operations within a single department (vertical benchmarking). However, to achieve dramatic, broad results, BPR requires a cross-functional focus on a process that cuts across many departments (horizontal benchmarking). BPR focuses exclusively on these cross-functional processes; benchmarking efforts, as a complement to BPR, usually need to assume a horizontal perspective at a minimum, although vertical benchmarking can be useful as well. In most cases, horizontal benchmarking efforts analyze *how* the process is structured and accomplishes work, as well as measure the performance of certain aspects of the process (such as error rates, turnaround time, costs, etc.).
- To begin measurement in Phase 1, several of the tools already presented can help with the more complex aspects of self-assessment, including process flowcharts, non-value-added

Exhibit 27.
Summary of Benchmarking Phases

Phase 1. Understand What is Currently Done Internally

1) Identify an area or problem for study.
2) Create a benchmarking team.
3) Conduct an internal assessment of existing process flows and performance measures; create a detailed list of performance drivers and constraints.
4) Define desired internal performance levels using an aggregation of existing "best practices" across the organization.
5) Identify areas where current performance is unsatisfactory.
6) Fix the easy problems.

Phase 2. Obtain Objective Information about the Performance of Others

1) Choose a benchmarking approach.
2) Develop a questionnaire, interview document, or other data collection tool.
3) Identify candidate participants (organizations and people).
4) Solicit candidates.
5) Send data collection tool to participants.
6) Interview participants or conduct site visits.

Phase 3. Analyze Benchmarking Information to Understand and Establish Performance Goals

1) Compare benchmarking data against original internal performance data and drivers; note similarities and differences for your institution and the benchmarking participants.
2) Classify and analyze the quantitative data.
3) Review qualitative data (interview comments) to identify innovative concepts and unique approaches.
4) Confirm data and findings where needed.
5) Reanalyze the quantitative results in light of the anecdotal interview comments.
6) Develop a draft model of best practice for the area under study.
7) Send the basic data to all benchmarking participants.

Phase 4. Develop and Implement an Action Plan to Achieve those Goals

1) Establish an implementation team to supplement the benchmarking team.
2) Measure internal operations against the proposed model.
3) Sort the identified performance gaps based on their importance to the overall strategic plan of the institution.
4) Prioritize performance gaps based on the institution's strategy, the impact of the change on customer satisfaction, and cost versus ease of implementation.
5) Have the implementation team begin facilitating the change process by holding meetings in the affected groups, taking suggestions for developing an action plan, and encouraging active involvement.
6) Create clear objectives that will provide short-run signals of improvement to reinforce the change process and motivate behavior.
7) Establish measurements that reflect improvement, or failure to improve, on the key proposed model measures.
8) Communicate the results in a positive manner.
9) Work with affected groups to establish long-range plans for meeting or exceeding benchmarked best practices.
10) Reinforce, learn, and change on an ongoing basis.
11) Benchmark again to recalibrate best-in-class.

Source: C.J. McNair and K.H.J. Leibfried, Benchmarking: A Tool for Continuous Improvement in The Coopers & Lybrand Performance Solutions Series (New York: Harper Business, 1992).

assessment, or volume analysis. In addition, exhibit 28 contains illustrative performance indicators that an institution may choose to measure. Please note that this is not a definitive list of benchmarks. Institutions will need to select the indicators relevant to their processes and will certainly need to enrich this list over time. By way of example, the NACUBO/Coopers & Lybrand benchmarking survey covers nearly 600 different benchmarks in a broad array of functions and processes.

- In Phase 1, the objective of identifying opportunities for improvement is not to lay blame on a manager or employee, but rather to focus on improving that process so the entire organization can function more effectively. Again, the purpose of benchmarking is to engender action and improvement. This type of analysis can help similar internal processes function as efficiently as the "best" internal process. Rigorous challenging can open up communication lines, establish common procedures and interpretations, and rid the organization of "historical" processes—those which have "always been done," even though there is no ostensible reason for carrying out these processes. The ultimate objective of this phase should be not only to identify weak spots but also to understand the drivers of the process—in other words, why do these weak spots exist and how can they be improved?

Completing the self-assessment and measurement in Phase I helps target areas for external benchmarking and structures the data-collection effort in the next phase.

Phase 2: Obtain Objective Information About the Performance of Other Institutions

Benchmarking builds off existing sources of information that can be tapped in a number of ways. How data are actually collected in this phase will depend on an institution's objectives, the resources it can bring to bear on the effort, and how quickly it needs results. Most institutions employ a hybrid of approaches to benchmarking. Benchmark data can be obtained through existing databases, surveys, or on-site walk-through visits. Each method of obtaining data offers specific advantages and drawbacks (discussed below).

- *Existing Databases*: NACUBO and Coopers & Lybrand jointly have led a landmark benchmarking effort in the higher education industry which documents nearly 600 benchmarks in 40 different functional areas. Currently in its third year, over 180 institutions participate in this annual survey-based benchmarking effort, where data are collected by the participating institutions and then "scrubbed" and reported by Coopers & Lybrand. Each participant receives a copy of the data results, which are presented by individual institution and summarized into six peer groups.
- *Customized Surveys:* Institutions can create their own tailored surveys to address specific issues and can administer them by mail, by telephone, or in person. The incentive for other institutions to participate is the shared peer data; therefore, do not ask for information that you are not willing to share. Personal interviews can yield more accurate, current information, but this type of benchmarking will consume more time and money than mail or telephone surveys. The advantage to using surveys is the relative ease of obtaining the information; the disadvantage in this approach will be ensuring accuracy and "apples-to-apples" comparisons.
- *On-Site Walk-Through Visits:* This is the most effective and most advanced form of benchmarking. This type of data collection will ensure the data applies directly to the issues at hand. Data collection will focus not only on performance measures but also on ideas, practices, and processes actually in place. This type of benchmarking also provides the clearest indicators of best practices, as the most knowledge is gained when using this method. This type of benchmarking requires a serious commitment of time and resources to the project, as well as a serious benchmarking partner with whom to exchange detailed information and on-site visits. On-site walk-through visits can be made somewhat less costly and more efficient by using existing databases and surveys to "jump-start" the data collection process. Doing the homework of data collection prior to an on-site visit tends to make the entire effort more efficient.

Phase 3: Analyze Benchmarking Information to Understand and Establish Performance Goals

This is the third phase in the overall approach to benchmarking. By this point, the institution has analyzed its own operations, collected data from

Exhibit 28.
Illustrative Performance Measurements for Benchmarking

Productivity

- Total transaction volume divided by total headcount
- Cost per "defect-free" unit produced
- Inventory turnover ratios
- Non-value-added costs/total costs
- Value-added costs/total costs
- Operating budget/transaction volume (for one department)

Quality

- Error rate
- Percent of transactions that are reworked
- Percent of total staff performing rework
- Number or percentage of transactions that receive exception processing
- Number of customer complaints
- Number of transactions or output returned by the customer
- Availability and accuracy of information

Customer Satisfaction

- Number and type of complaints
- Satisfaction rating
- Number of customer contacts per transaction processed
- Number of steps or hurdles faced by customer to complete a transaction

Timeliness

- Turnaround time to process a transaction
- Number or percentage of transactions not completed on time
- Number of transactions in the backlog
- Inspection number and time
- Value-added time/total processing time
- Days to close general ledger or accounts
- Lag days in producing and distributing reports

Complexity of the Service or Product

- Number of times the transaction is moved from one place to another
- Number of parts of the product or copies of the form
- Average number of ways a form can be used or "variations" for a particular transaction type
- Number of the types of transactions processed by a particular department

Existing Capacity

- Number and location of bottlenecks (places where backlogs occur)
- Average processing batch size
- Number of people who actually "touch" the transaction throughout the entire process
- Volume fluctuation (seasonality)
- Number of quality-control or inspection points

Source: C.J. McNair and Kathleen H.J. Leibfried, Kathleen H.J. Benchmarking: A Tool for Continuous Improvement *in The Coopers & Lybrand Performance Solutions Series (New York: Harper Business, 1992), pp. 168-175.*

other institutions, and is ready to synthesize its research efforts and draw conclusions. Two aspects of this phase are discussed below: defining similarities and differences among benchmarked institutions and classifying data.

- In Phase 3, benchmarking's effectiveness is defined by the level of comparability between the benchmarking participants. If comparability is low, the usefulness of the data will also be low. The first step in analyzing the data, therefore, is to understand the similarities and differences among the participating institutions. Institutions that are different can still provide useful insights, but their practices have to be carefully evaluated and then adapted for feasible implementation at another institution.

  This does not mean, however, that the participants must be "peers" in the traditional sense of higher education peer groups. It does mean that the benchmarked processes should have similar goals and customer expectations/needs. Comparable volumes are also helpful.
- To classify data in Phase 3, each institution's response to a particular question should be listed in a table along with the maximum, minimum, median, mean, standard deviation, and semi-interquartile range values.[12] To be more visual, this same data could, of course, be presented in graphical format. The table in exhibit 29 is a sample from the report on the NACUBO/Coopers & Lybrand benchmarking survey. Significant trends can often be spotted this way. While more elaborate statistical approaches may look more "precise," they can seldom be effectively used in a benchmarking study because the underlying sample size is simply too small. In addition, the aim of operational benchmarking is not statistical rigor or "auditable" results. Rather, benchmarking should provide a springboard for operations improvement, a starting point in the search for best practices.

Another effective analytical tool is a "scatter diagram," which graphs potentially related benchmarks with one benchmark on the x-axis and a second on the y-axis. Exhibit 30 displays one analysis where a scatter diagram was used. The fact that the points fall roughly along a straight line potentially indicates a direct correlation between these two benchmarks. In this case, the number of grants and contracts awards received at the institution per FTE in the sponsored research office was directly proportional to the number of grant or contract proposals that were reviewed and processed per FTE in this staff group. By analyzing a variety of scatter diagrams and exploring relationships among different aspects of performance, the analyst can understand what fundamental factors drive performance. It is these factors that are targeted during redesign.

- Many other techniques can, of course, be used to analyze the data. Each of these quantitative analyses should be coupled with the anecdotal and qualitative information gleaned from the survey and interview process. The result of the analyses should be general lists of those areas where:
  - the institution's performance is above average,
  - performance is approximately equal to the benchmarked institutions, and
  - the institution's performance is substandard.

Phase 4: Prepare and Implement an Action Plan to Achieve Established Performance Goals

The ultimate goal of the benchmarking effort is to generate action. After data collection and analysis are complete, it is time to turn the team's attention to implementation. The benchmarking analysis should be combined with several other

12. Semi-interquartile range is a substitute for standard deviation as a way of identifying significant differences in performance. The semi-interquartile range is a measure of how spread out or dispersed the data are. It is calculated on the basis of quartiles within a distribution. The upper quartile (Q_3) is the point below which 75 percent of the cases fall, and the lower quartile (Q_1) is the point below which 25 percent of the scores lie. Thus, the semi-interquartile range indicates the range of scores within which the middle 50 percent of the scores lie (i.e., clustered around the median). Because this index is a measure based on middle scores rather than extreme scores, its use is more stable than the use of standard deviation, particularly in cases where there is not always a single, normal distribution. It should be noted that the addition of one deviant case at either extreme for a distribution would leave the semi-interquartile range virtually untouched. The NACUBO Benchmarking Project chooses to use median scores and the semi-interquartile range to mitigate the effects of extreme scores in the national benchmark data. Polit, Denise and Hungler, Bernadette, *Nursing Research, Principles and Methods*, second edition, Lippincott, Philadelphia, 1983.

Exhibit 29.
Sample Tabular Output from NACUBO Benchmarking Report

Development Office: Turnaround Time from Gift Receipt to Mailing of Acknowledgment

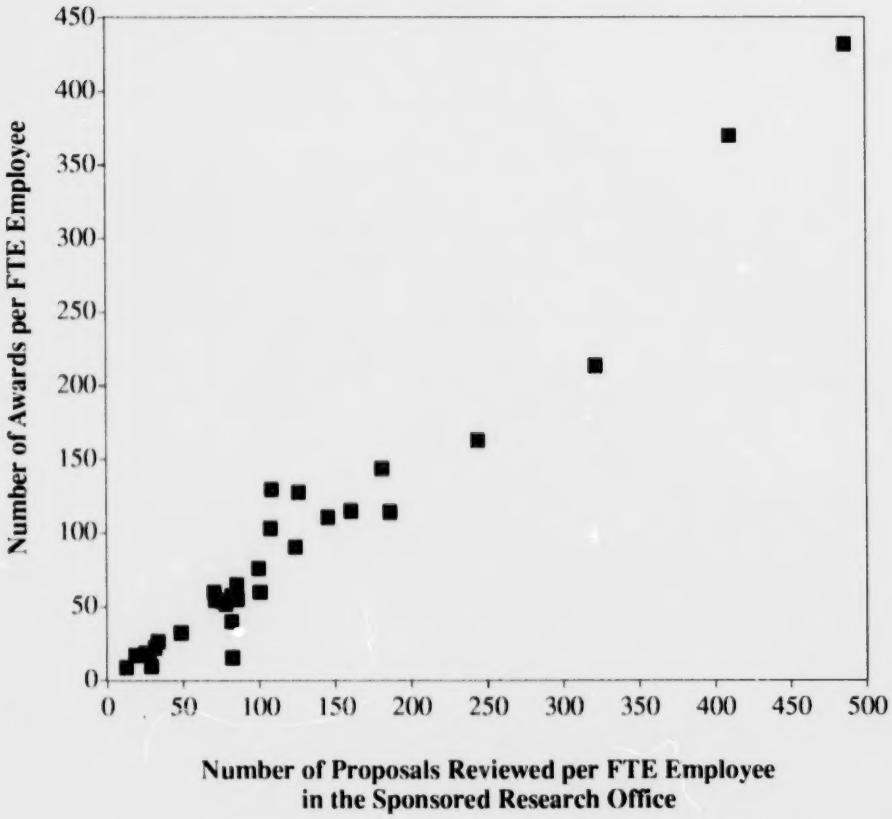
Turnaround Time from Gift Receipt to Mailing of Acknowledgment (in days)							
Statistics	**Public Research**	**Private Research**	**Public Comprehen-sive**	**Private Comprehen-sive**	**Liberal Arts**	**Two Year**	**All**
Statistical Population	32.0	5.0	35.0	19.0	14.0	25.0	130.0
Median	5.0	5.0	3.0	3.4	2.0	4.0	3.5
Mean	5.7	5.0	3.7	3.9	2.3	4.9	4.3
First Inter-quartile	3.5	NA	2.0	2.0	1.2	2.0	2.0
Third Inter-quartile	7.0	NA	3.7	4.5	3.0	7.0	5.0
Minimum	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Maximum	30.0	7.0	14.0	8.5	5.0	14.0	30.0

Individual Institution Results													
A NC	O 3.50	AC 30.00	AQ 7.00	BE NC	BS 3.00	CG 3.00	CU 2.00	DI 4.00	DW 3.00	EK 5.00	EY 1.50	FM 13.00
B NC	P 7.00	AD 2.00	AR 7.00	BF NC	BT 2.00	CH 10.00	CV 3.00	DJ 7.00	DX 1.00	EL NA	EZ 2.00	FN 7.50
C 5.25	Q 5.00	AE 3.60	AS NC	BG NC	BU 1.00	CI 8.50	CW 3.00	DK 2.00	DY 1.00	EM NA	FA 3.00	FO 1.50
D NA	R 4.00	AF 1.20	AT 1.00	BH NC	BV 1.80	CJ NA	CX 3.40	DL 3.50	DZ 2.00	EN 5.00	FB 2.00	FP NA
E 10.00	S 6.00	AG NA	AU 5.00	BI NC	BW 2.00	CK 4.00	CY NC	DM 3.39	EA 3.00	EO 1.50	FC 2.00	
F 1.00	T 5.00	AH NC	AV 5.00	BJ NC	BX 7.00	CL 2.00	CZ 5.00	DN 3.00	EB 1.40	EP 4.00	FD 2.00	
G NC	U 2.00	AI 3.00	AW 5.00	BK NC	BY 3.50	CM 3.00	DA 2.00	DO 1.00	EC 1.00	EQ 7.00	FE 7.00	
H NC	V 7.00	AJ 3.00	AX NC	BL NC	BZ 5.00	CN 2.00	DB 8.00	DP 8.50	ED 3.00	ER 7.00	FF 2.00	
I NC	W 7.00	AK 5.00	AY NC	BM NC	CA 3.00	CO NA	DC 2.00	DQ 7.00	EE NA	ES 7.00	FG 3.00	
J 7.00	X NC	AL 5.00	AZ NC	BN NC	CB 2.00	CP 2.00	DD 2.50	DR 3.00	EF 4.00	ET 5.00	FH 14.00	
K 5.00	Y 4.00	AM 5.00	BA NC	BO NC	CC 2.00	CQ 3.50	DE 2.00	DS 2.00	EG 2.00	EU 8.50	FI 5.00	
L 6.00	Z 5.00	AN NC	BB NC	BP NC	CD 3.00	CR NC	DF 3.50	DT 2.00	EH 3.00	EV 4.00	FJ 1.00	
M 7.00	AA 7.00	AO 4.00	BC NC	BQ 2.00	CE 2.00	CS NA	DG 5.00	DU 4.00	EI 2.00	EW NC	FK NA	
N 8.00	AB 5.00	AP 3.00	BD NC	BR 3.00	CF 14.00	CT 1.00	DH 2.00	DV 7.00	EJ 1.00	EX NA	FL 5.00	

NA = Data not available

NC = This section not completed by the reporting institution

Exhibit 30.
Sample Scatter Diagram Relationship Between Number of Proposals Reviewed and Awarded per Sponsored Research Departmental FTE



Source: NACUBO Benchmarking Project: Operational Benchmarking of Administrative and Business Costs in Higher Education, Final Report, FY 1991.

BPR tools that have already been presented to redesign and implement new processes.

With the analysis complete and improvements proposed, the real work begins. The hardest part will be actually changing the way the institution works. The critical success factors in implementation will be effectively addressing people issues as emphasized throughout the "change management" sections of chapter II. Communication channels, performance measures, and organization objectives sometimes must be radically changed, along with the actual business processes, to maintain consistency with BPR principles and redesign.

Concluding Comments

Benchmarking, whether used as a stand alone program or as part of BPR or TQM, requires the same dedication to continuous evaluation and improvement. Simply stated, the goals are to understand current performance, compare it to others, improve it, and then repeat the cycle. Two key points emerge from these goals. First, the internal analysis phase cannot be overlooked. It is absolutely critical for the institution to understand its own operations and to begin to improve the obvious, before looking outside for better practices. The

internal assessment of one or a few areas may progress into a comprehensive internal benchmarking study.

Second, while implementation is always difficult, the quantitative aspects of benchmarking and BPR give the institution's change agent an added advantage over more traditional change methods. The objective, verifiable nature of benchmarking and BPR results may lead to discomfort, but nevertheless cannot be discredited. The facts speak loudly for themselves as a powerful voice for change.

Customer Analysis

Objectives and Overview

Meeting customer needs is the crux of BPR. Thus, customer analysis is an important tool in charting the course for BPR and targeting specific areas for improvement. Specifically, customer analysis can be used to:

- Understand customer needs, expectations, and priorities.
- Understand overall customer satisfaction with current services or products.
- Understand the factors that impact customer satisfaction.
- Understand customer satisfaction with specific attributes of services or products.
- Identify desirable services not currently provided.
- Help prioritize improvement efforts.
- Measure changes in customer satisfaction over time.

In the late 1980s, businesses began to recognize the vital importance of their customers and to incorporate the "voice of the customer" into every aspect of business, including: strategy, operations, marketing, and human resources. The call to focus on customers now beckons to higher education—and it's an important one to heed. Studies from the United States Office of Consumer Affairs found the following:

- The average organization never hears from 96 percent of its unhappy customers. For every complaint received, the average company in fact has 26 customers with complaints, 6 of which are serious problems.
- The average customer who has a complaint tells 9 other people about it, and 13 percent of customers who have a complaint discuss it with more than 20 people.[13]

Using benchmarking to meet customer needs can help BPR teams obtain and introduce the "voice of the customer" into core operations and processes.

Suggested Use and Application

As part of BPR, customer analysis is generally applied in three ways: establish context of detailed measurement efforts, establish customer satisfaction and priorities, and measure ongoing process performance.

Application	Distinguishing Results
The first goal is to establish the context of an improvement effort and identify the particular topics or factors the effort should address, usually through group discussions or individual interviews.	This effort will be "exploratory research" with mostly qualitative results that are useful in conjunction with other quantitative measurement programs. This type of customer analysis can answer questions such as, "Are our customers generally satisfied?" "Where do they see opportunities for improvement overall? Where should we start first?"
The second goal is to obtain specific information on customer needs, expectations, current satisfaction, priorities, and ideas for improvement (usually telephone surveys, written surveys, or interviews).	This will be the core of the analysis effort, featuring both quantitative and qualitative results, which should help management establish improvement priorities, plans, and measurement programs.
The third goal is to measure the ongoing changes in process performance from the customer's perspective (usually written surveys or internal process measurements).	These quantitative measurements will help management and employees measure progress over time and ensure that customer requirements are continually and appropriately addressed.

13. William A. Band, *Creating Value for Customers: Designing & Implementing a Total Corporate Strategy* from the Coopers & Lybrand Centre for Excellence in Customer Satisfaction (New York: John Wiley & Sons, 1991), p. 13.

Directions

This section details a customer analysis program which is effective for use in business process redesign. Many corporations have developed far more comprehensive customer programs with demonstrable success.[14]

Establish the Context for a Customer Measurement Program

Using group discussions or individual interviews, gather overall performance information from internal and external customers, management, and employees.

Group discussions of six to ten people should be led by an experienced facilitator with a specific agenda to explore particular issues. The agenda should serve as a guide, rather than a rigid schedule, as each group will have its own "personality" and will naturally focus on some issues more than others.

A reasonably small number of individual interviews should also be conducted, primarily with important customers and senior management, to discuss overall customer expectations, satisfaction, factors influencing satisfaction, and priorities. A structured interview guide should be developed to help the interviewer direct the discussion.

The greatest benefit of both of these techniques is the face-to-face interaction with customers, which allows for clarification of certain points, assessment of body language, and discussion of important topics not necessarily identified for the agenda. This background, discussion-based research builds the foundation for more intensive databased research in the next step.

Plan the Customer Research Effort

To plan the customer analysis, the analyst will need to decide who to survey and the size of the survey sample.[15]

BPR focuses first on the needs of the external customer (such as students, parents, faculty, granting agencies, the local community), and thus research should certainly target any group which may include current, former, or even potential customers. Many business processes in higher education specifically exist to serve internal customers who are employees of other administrative units.

Surveying internal customers is also an essential component to customer research. Finally, the BPR team may want to consider surveying employees who are part of the process to learn their opinions regarding working conditions, process efficiencies, management, and so on. Of course, each of these three groups would probably require a different survey instrument, addressing their relevant concerns.

For BPR, surveys are typically based on a random sample, but the team may also develop a "stratified" random sample that targets a specific number of responses for each major type of customer. For example, the BPR team may want to distinguish between management and staff responses for a particular survey. According to statistical theory, 30 responses are required for statistical validity, but at least 100 responses are recommended to build a solid case for change.

Design the Data-Collection Instrument

In the previous step, the analyst determined the recipients and the size of the survey. In this step, the analyst determines how and what to ask. The research tool itself may take on many shapes and forms, from a simple customer comment card to a detailed survey administered in person, by mail, or by telephone. However, each instrument should be designed according to the basic principles outlined in exhibit 31.

Exhibit 32 presents a framework for the subject matter typically addressed in a questionnaire. Within this framework, BPR analysts should incorporate the basic concerns articulated by management, employees, and customers into the survey. Additionally, analysts must be sure to include a range of questions that prompt both quantitative and qualitative responses. Ratings scales (1 to 10, 1 to 5, poor to excellent, always/sometimes/never, etc.) also should be added, usually with respect to those questions that measure either satisfaction, quality, or cost.

After a draft has been developed, it is wise to ask for review and comments from a limited number of managers, employees, or customers before issuing the final survey. Don't skip this review

14. For additional information, the reader may wish to consult an excellent, quite readable resource on improving customer satisfaction: *Creating Value for Customers: Designing and Implementing a Total Corporate Strategy* by William A. Band from the Coopers & Lybrand Centre for Excellence in Customer Satisfaction, Toronto, Canada (John Wiley & sons, 1991).
15. Ibid., pp. 105–108.

Exhibit 31.
Ingredients for Success in Designing a Research Tool to Solicit Customer Satisfaction Information

1. It should focus on customer expectations and on customer perceptions, not on what the company thinks it is delivering.
2. It should focus on the quality of the product or service, not on laying blame on an individual or group.
3. Employees must be involved in developing the customer satisfaction measures, so that measures will be more relevant to their day-to-day jobs. This will lead to greater employee acceptance of the metrics; furthermore, staff-developed standards are usually more demanding than the ones management would recommend.
4. Both qualitative and quantitative data should be gathered. The specific comments help to explain the numbers.
5. Questions in the survey or interview should be specific; and, if the research is to be carried out along with other work activities, it must be easy to collect and understand.
6. The research instrument should be designed so that management and/or employees can take action or implement change based on its results. Without priorities, there is no basis for determining what to fix first.
7. Finally, rewards for making positive changes based on the results of a survey should be visible and valuable.

Source: *William A. Band, Creating Value for Customers: Designing & Implementing a Total Corporate Strategy from the Coopers & Lybrand Centre for Excellence in Customer Satisfaction (New York: John Wiley & Sons, 1991), pp. 77-78.*

Exhibit 32.
Information Questionnaire Should Request from Customers

- An overall evaluation of their satisfaction level
- An indication of their needs and expectations with respect to the category of products or services that the company provides
- An evaluation of the company's performance against these expectations
- An indication of any specific problems or complaints they might have
- Customer classification information, which will allow the researchers to analyze the customer responses by subgroups after all the data have been collected

Source: William A. Band, Creating Value for Customers: Designing & Implementing a Total Corporate Strategy from the Coopers & Lybrand Centre for Excellence in Customer Satisfaction (New York: John Wiley & Sons, 1991), pp. 77-78.

cycle as information received will prove valuable. Appendix C contains two sample surveys developed by BPR teams at a state university for the solicitation of high-level customer feedback. Please note that each BPR team *must* develop a survey that meets its own specific needs in terms of content, style, and format, rather than simply adopting a survey from another institution.

One of the goals of the BPR team should be to develop a customer-satisfaction measurement system that is repeatable over time. This program will build on the initial survey effort and should include future written or telephone surveys. In addition, the team should identify "in-process" measurements that contribute to customer satisfaction, such as turnaround time to process a form, number of times the phone rings before being answered, and so on. These process measurements are just as important as surveys in quantifying customer satisfaction and performance improvement.

Interpret Results

Depending on the number and complexity of responses, results are analyzed via a spreadsheet or database using standard statistical theory, including mean, frequency distribution, standard deviation, etc. The chart in exhibit 33 presents a sample analysis derived from a customer service survey on course scheduling and registration. A spreadsheet was used to enter and calculate results. Graphs were then created to make the results more easily and visually understood. Another way to analyze results is to use a particularly helpful tool for customer analysis called the "opportunity map" presented in exhibit 34.

By asking customers to rate the importance of several attributes and then to also rate their current satisfaction with respect to these attributes, the BPR team can begin to evaluate and prioritize improvement opportunities. As indicated in exhibit 34, items that fall into or closest to the upper left quadrant require immediate attention from the BPR team. Exhibit 35 presents a sample of a completed opportunity map which was derived from the results of the sample survey in appendix C.

Concluding Comments

BPR can help colleges and universities reach their ultimate goal of improving value for customers. The tool presented in this section will help employees and managers understand what value specifically means to customers, paving the way for processes that more effectively and efficiently meet the customer's needs.

Exhibit 33.
Sample Analysis of Customer Survey Results

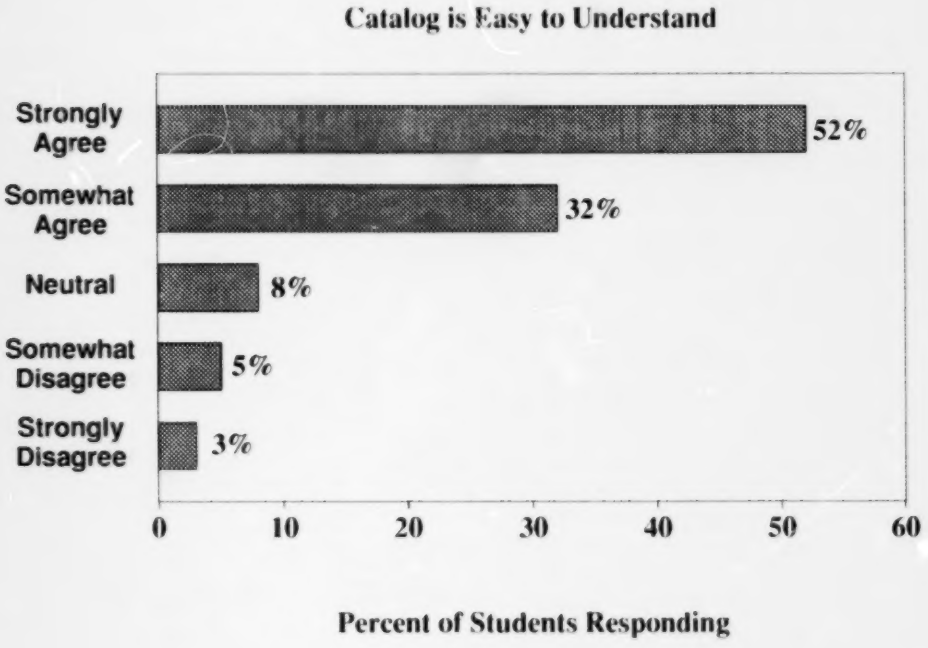
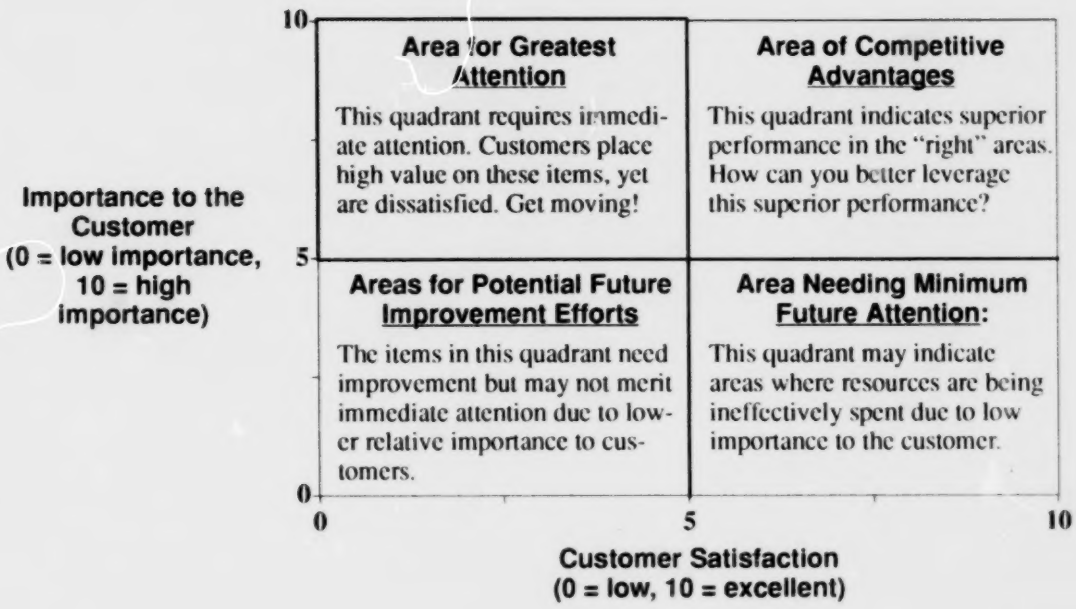
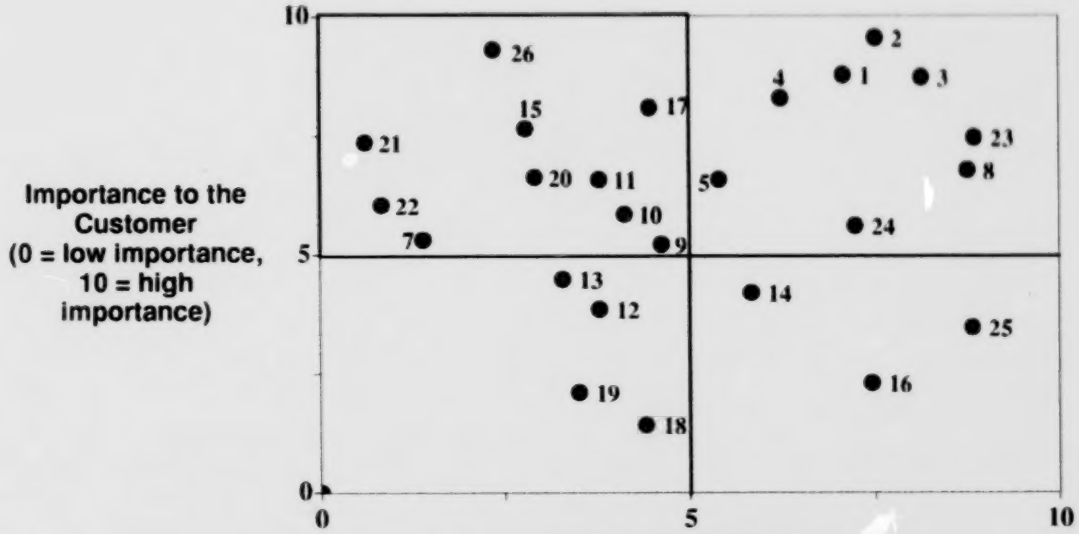


Exhibit 34.
Customer Satisfaction Opportunity Map


Area for Greatest Attention
This quadrant requires immediate attention. Customers place high value on these items, yet are dissatisfied. Get moving!
Area of Competitive Advantages
This quadrant indicates superior performance in the "right" areas. How can you better leverage this superior performance?
Areas for Potential Future Improvement Efforts
The items in this quadrant need improvement but may not merit immediate attention due to lower relative importance to customers.
Area Needing Minimum Future Attention:
This quadrant may indicate areas where resources are being ineffectively spent due to low importance to the customer.
10
5
0
0
5
10
Importance to the Customer (0 = low importance, 10 = high importance)
Customer Satisfaction (0 = low, 10 = excellent)

Derived from: Coopers & Lybrand, BreakPoint Business Process Redesign, in the Coopers & Lybrand Performance Solutions Series, (Arlington, VA: Coopers & Lybrand, 1992), p. 153.

Exhibit 35.
Sample of a Completed Customer Satisfaction Opportunity Map



1 = Timely delivery of goods
2 = The goods satisfy expectations
3 = Good value for the money spent
4 = Easy and trouble-free order placement
5 = Ability to track orders
6 = Ease in resolving issues with problem orders
7 = Online vendor/product information
8 = Control over product selection
9 = Prompt payment of vendor
10 = Availability of unit's purchasing activity information
11 = Availability of account/fund balance information
12 = Ability to lien all purchases at time of origin
13 = Easy tracking of payment status
14 = Availability of expert advice on campus
15 = Clarity and consistency in purchasing policies and procedures
16 = Availability of demonstration models for examination/trial
17 = Ability to reach live person on telephone
18 = Ability to interact with single buyer for all purchasing needs
19 = Purchasing training available
20 = Reduced number of authorizations
21 = Online purchasing system integrated with online financial system
22 = Online policies and procedures
23 = Good vendor relations
24 = Reduced need for purchase justifications
25 = On-campus storehouse for basic supplies
26 = Method to handle rush orders

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Chapter IV

Examples from Practice

While chapters I through III developed the conceptual framework and described the tools for business process redesign in higher education—the "hows" and "whys" of BPR—this chapter answers a different set of questions—the "whats." Issues addressed in this chapter are as follows.

- What effect does BPR really have on an institution?
- What is the impact of BPR on a process?
- What does a streamlined process look like?
- What did the process look like before BPR?
- What are some examples of processes from different areas that have undergone BPR?
- Which BPR tools were used, and what results did they yield?
- What benefits were achieved through BPR?
- What lessons are learned as part of BPR?

Six examples (data disguised) of actual BPR projects conducted at colleges and universities provide answers to these questions. It is important to remember that this was *real* BPR at *real* institutions. The examples address six different processes or subprocesses that were re-engineered:

- Procuring goods
- Managing facilities
- Admitting undergraduate students
- Creating a course schedule
- Updating employee personnel records
- Disbursing financial aid awards

These examples illustrate from a broad perspective the need for BPR, the potential impact of BPR, the focus of the analyses, and the results BPR tools may yield. The tools used in these examples are discussed at length in chapter III.

What Does Each Case Study Include?

Each case study has approximately five sections, supported by explanatory exhibits:

Background—provides an overview of the institutional context and its processing problems precipitating BPR.

BPR Tools and Techniques Applied—briefly lists the types and purposes of the BPR tools that were applied to analyze the issues and derive solutions.

Findings and Conclusions—presents the major results of the BPR analysis.

Recommendations and Results—presents the proposed process redesign, other improvement suggestions, and results achieved.

BPR Summary—highlights any major lessons learned from this BPR effort.

The exhibits in each case study illustrate the results of the BPR tools. Each case study uses a subset of the BPR tools that are explained in the previous chapter. The matrix in exhibit 36 shows which tools were used in each study.

How Should This Chapter Be Read?

This chapter broadly describes the situation, major conclusions, and results of several BPR initiatives. Executives or casual readers simply may want to read one or two case studies to understand BPR from a high-level perspective. The BPR summary at the end of each case study may also provide executives with helpful hints and significant lessons learned. Readers who will be part of a BPR team or responsible for applying a BPR tool may want to read in detail the particular case studies that are similar to a process they will be redesigning or that employ the BPR tool they will be using.

Please recognize that processes with the same name (e.g., registering students) may differ greatly from institution to institution. These examples and recommendations should not be presumed to apply to a BPR team member's particular institution.

Exhibit 36.
Tools Used in Each Case Study

Case Studies \ Tools	Value-Added/ Non-Value-Added Analysis	Work Distribution Chart Analysis	Using Process Flowcharting	Cost of Quality Analysis	Volume Analysis	Benchmarking	Customer Analysis
Procuring goods	✓	✓	✓	✓	✓		
Managing facilities		✓		✓	✓	✓	✓
Admitting undergraduate students	✓	✓	✓	✓	✓		
Creating a course schedule	✓		✓		✓		✓
Changing an employee's record	✓	✓	✓				✓
Disbursing financial aid awards	✓		✓		✓	✓	✓

Procuring Goods

Background

ABC University is a large, multi-campus, public research institution with an annual operating budget over $700 million. Facing five consecutive years of harsh budget cuts, ABC launched work redesign efforts in four key administrative processes, focusing on improved efficiency, cost-effectiveness, and customer orientation. The procurement process proved to be one of the areas most ripe for BPR.

BPR Tools and Techniques Applied

Process flowcharts, non-value-added (NVA) assessment, workload volume analysis, work distribution charts, and cost of quality analysis were used to evaluate ABC's universitywide process for procurement of goods. The output of each tool met certain analytical needs, as specified below:

- Creating Process Flowcharts with NVA Assessment:
  - Quantified process costs and identified cost drivers
  - Identified bottlenecks
  - Identified and quantified the effects of non-value-added activities
  - Quantified elapsed time for process steps
- Volume Analysis of Workload:
  - Highlighted the changes in workload over time
  - Contributed to building the case for change
  - Quantified changes over time in various transaction types
  - Identified the effects of policies and approval structures on the volumes of various transaction types
- Creating a Work Distribution Chart:
  - Quantified how staff members spend their time
  - Highlighted groups of activities that consume considerable staff resources
  - Identified activities with the greatest opportunity for improvement
- Cost of Quality Analysis:
  - Quantified percent of staff time and costs devoted to non-value-added activities
  - Contributed to understanding types and drivers of non-value-added activities
  - Quantified potential cost savings

In addition to the above analyses, several departmental managers were interviewed to gain an understanding of past practices, current and future improvement efforts, cross-functional interactions, perceived customer satisfaction, management issues, and their impressions of opportunities for improvement.

Findings and Conclusions

This analysis generated four major conclusions centering around policies, systems, workload, and quality. Each of these four is presented below, followed with the supporting detail derived from each of the analytical tools.

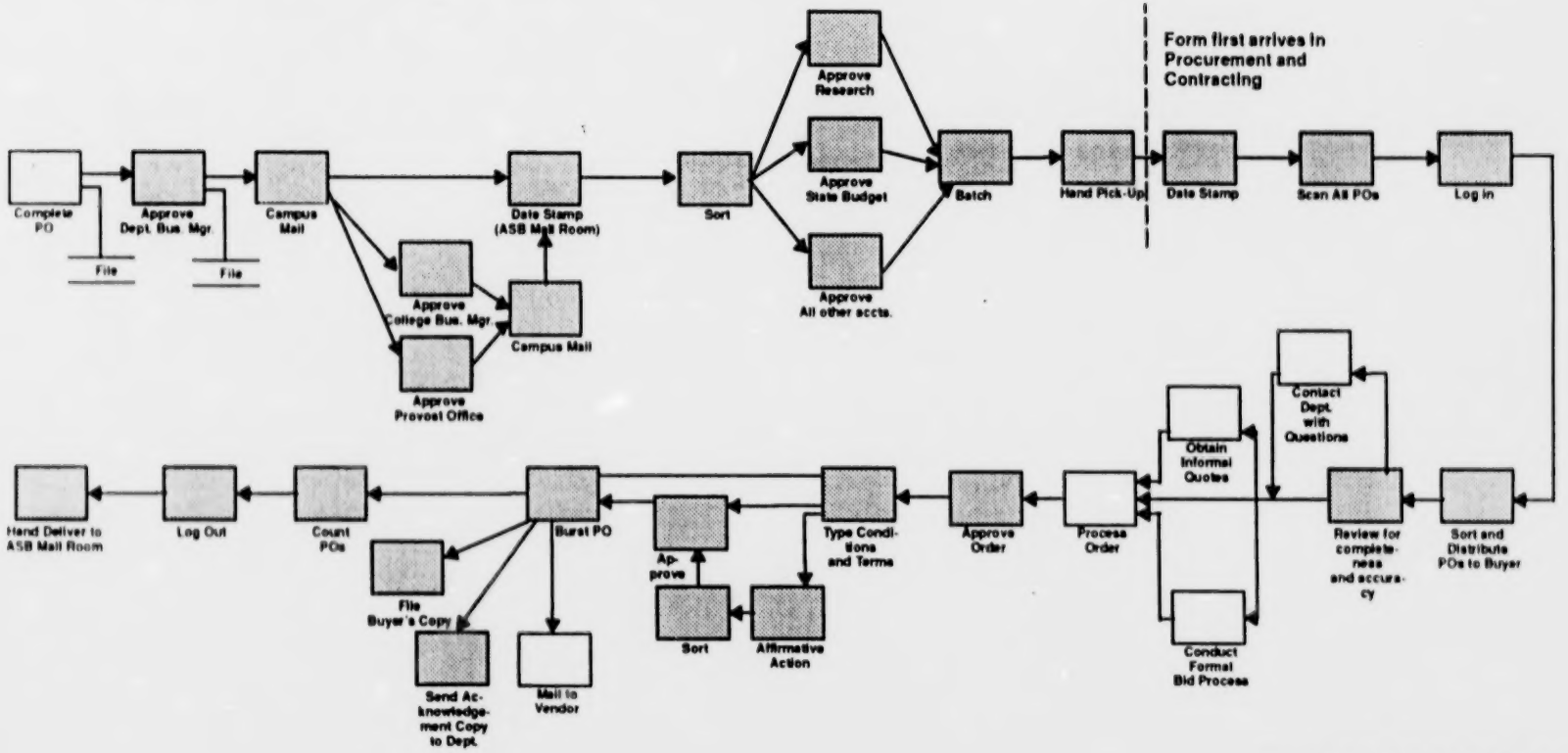
The universitywide procurement approval policies were overly complex, with inappropriate limits that significantly impeded turnaround time and customer service in the procurement process.

- *Complexity of Central Approval Policies Delayed Processing and Increased Costs:* The flowchart in exhibit 37, completed using the process flowchart tool, illustrates the total procurement process, beginning with the originating department, moving through central approvals, and ultimately reaching the procurement office. Using value-added assessment, the unshaded, clear boxes on the diagram represent steps that directly contributed to the "output" of the process. If a transaction followed only the clear boxes on the diagram, the customers' needs were met: a purchase order (PO) was mailed to the appropriate vendor. From the customer's perspective, the clear boxes, then, were value-added activities.

  On the other hand, the shaded boxes indicated steps that were currently required but either did not directly contribute to the output or were redundant steps in the system. These steps were classified as non-value-added. Before the purchase order even arrived at the procurement office (indicated by the vertical dotted line), ABC's approval policies resulted in numerous time-consuming, non-value-added steps. These were exactly the types of steps that were eliminated through BPR.

  A review of the approval structure, summarized in exhibit 38, showed that ABC did not adequately link accountability, authority, and responsibility. In this diagram, the solid circles

Exhibit 37.
Current Purchase Order Processing



Source: Process Flow Charting and Value Added Analysis

Exhibit 38.
Purchasing Approval Structure, ABC University

	Responsibility for Making the Decision to Spend Budget	Authority to Approve Budget Expenditures	Accountability if Budget is Misspent
Department Head	○	●	
College Business Office		●	○
Provost Office			○
Budget Office (Controller)		●	○
Procurement and Contracting		●	

○ Partially
● Fully

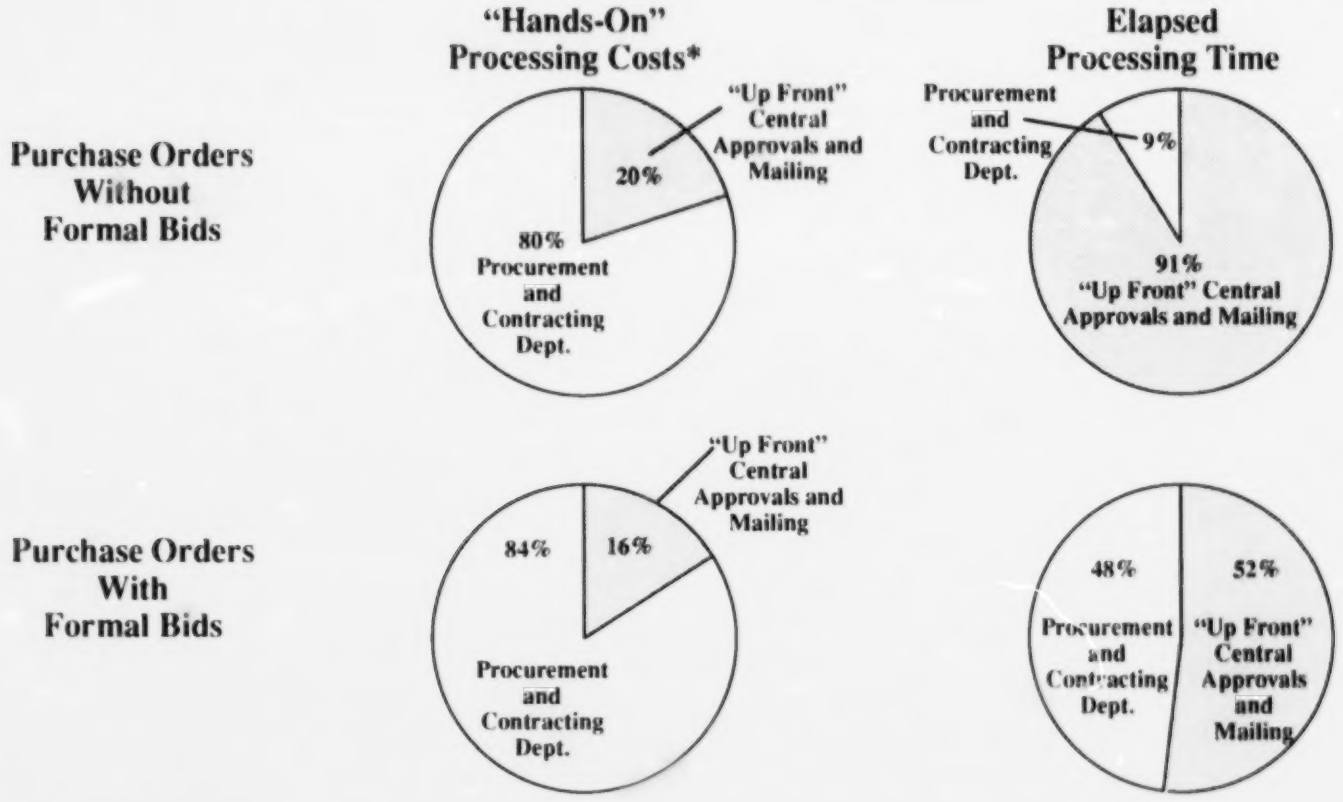
Accountability at this university was very weak; therefore, if funds were misspent, it was unclear who ultimately was accountable and what recourse would be taken.

Source: Process Flow Charting, Department Interviews.

implied that the individual or office listed in the left column had *full* responsibility, authority, or accountability for the transaction. No single office had solid circles all the way across its row, showing that no office had full responsibility, authority, and accountability. Therefore, while department chairs were responsible for spending their budgets, a series of other departments were required to authorize the department chairs' spending decisions. In addition, the sheer number of approvals (there were eight shown in the process flow diagram) indicated institutional confusion over who was responsible for what. These extra approvals greatly affected costs, time, and especially customer service. The pie charts in exhibit 39 show the distribution of costs and time across the PO process flow—both for simple POs and for more complex orders requiring competitive bids. In the existing process, it cost $35.20 to process a PO without a formal bid and $83.07 to process a PO with a formal, competitive bid.[16] Although the two left charts show that it was relatively inexpensive for a representative of the college's business office or the provost's office to review forms, both charts on the right show that the impact on processing time was

16. Costs include the salary and benefits of the employees who touch the transaction.

Exhibit 39.
Purchase Order Processing Estimated Costs and Elapsed Time



* *Costs include labor and fringe benefits only.*

Source: Process Flow Charting
ABC University

tremendous. Central approvals accounted for approximately 91 percent of elapsed processing time for POs without bids and more than half of elapsed processing time for POs with formal bids. In fact, once a "non-bid" PO entered procurement and contracting, it was processed in less than two days.

- *"Quick Order" Policy Set Dollar Limit Too Low:*[17] In FY1990, ABC streamlined processing for orders under $250 by allowing departments to send "quick orders" directly to vendors, bypassing most of the central approval process and the procurement and contracting department. The volume analysis tool showed that since FY90, quick orders accounted for nearly 60 percent of the number of orders but less than 5 percent of the total dollar value of purchases made at the university, as illustrated by the bar charts in exhibit 40. Although the quick orders certainly met the goal of "speed-processing" low-dollar, low-risk transactions, the total dollar value of all quick orders processed was rather low compared to the university's total purchasing activity. This low percentage (less than 5 percent) was one indicator that ABC could afford to increase the dollar limit for quick orders. This type of analysis helped the team to prove the need to raise the quick order dollar limit.

  Another indicator that approval limits were too low was the change in the volume and dollar value of regular purchase orders processed by Procurement and Contracting, again analyzed through Volume Analysis. First, the line graph in exhibit 41 shows that, despite the introduction of quick orders, the number of regular POs continued to increase dramatically (the darker, solid line). Second, the average dollar value of the regular POs had not changed markedly since the availability of quick orders (less than a net 2 percent change from FY90 to FY92 as shown on the dashed line with square markers). Normally, it would be expected that the average dollar value of regular POs would increase measurably, as the low-dollar transactions were processed by quick orders. Finally, the number of bids processed (POs over $14,700) steadily declined. These three factors indicated that the volume of medium-sized POs (POs between $250 and $14,700) was growing. This suggested that both the workload and the purchasing risks associated with the POs might be better managed by increasing the quick order dollar limit. By doing this, ABC could reduce the volume of lower-value POs that flow through the complex process, focusing greater attention on the important higher-dollar, higher-risk transactions.

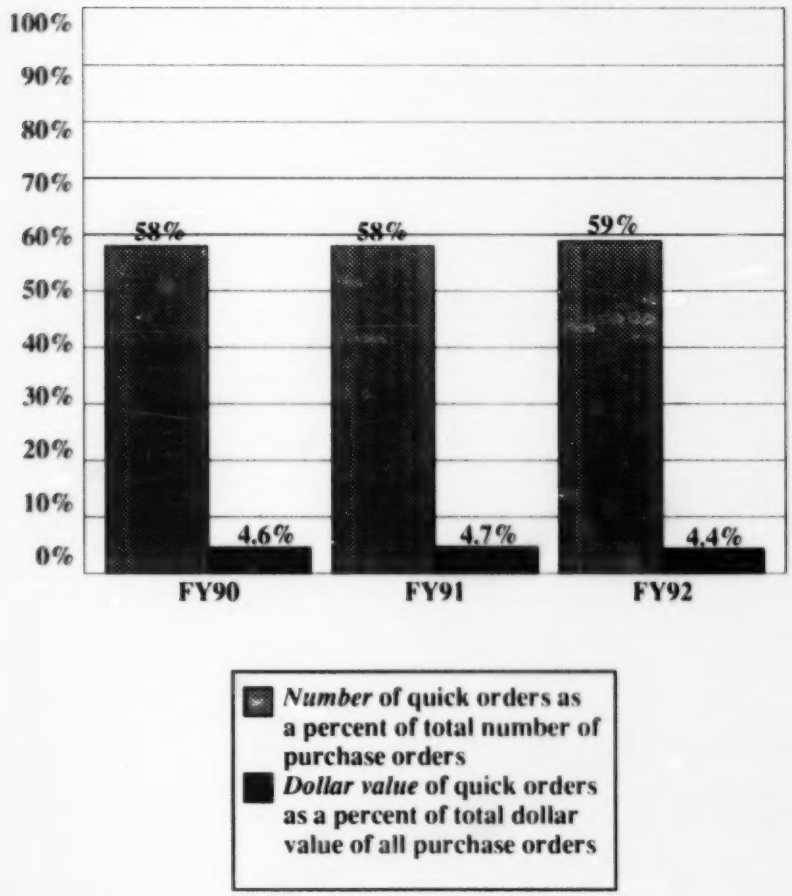
  The lack of an automated procurement system led to a void of management information, decreased customer service, and impeded modern operations and savings.

- *Complete Void in Management and Operational Data:* In the existing setup, all management data had to be developed and tracked manually, either on paper or on computerized spreadsheets (manual data entry and manipulation). The Work Distribution Chart shows that, in aggregate, Procurement and Contracting staff spent almost 4 percent of their time logging and tracking statistical data, the equivalent of $50,000 annually. With an automated system, data would automatically and instantaneously be tracked and reported for many purposes including all departmental-level purchasing activities, universitywide purchasing activity, vendor inquiries, contract pricing, order status,change orders, asset control, audit trails, historical data, and financial reporting. Clearly, this is the type of routine data that is needed to manage purchasing within a large university, and must be obtainable in the redesigned process. Again, the BPR analyses helped prove the need to automate to senior management.

- *Decreased Customer Service and Communication:* While a formal customer analysis was not conducted, several customer service issues arose from interviews. Under the original conditions, once a customer submitted a purchase order, he or she had no contact with Procurement until the acknowledgment copy of the PO was received or unless the customer contacted

17. A very simple volume analysis of the distribution of purchase orders over defined dollar ranges would quickly answer this question and would help to define the "optimal" dollar limit for quick orders. Unfortunately, this data was unavailable, as neither ABC's Procurement and Contracting Department nor its Accounts Payable Department had computer systems to track this type of data.

Exhibit 40.
Quick Orders as a Percent of all Purchase Orders



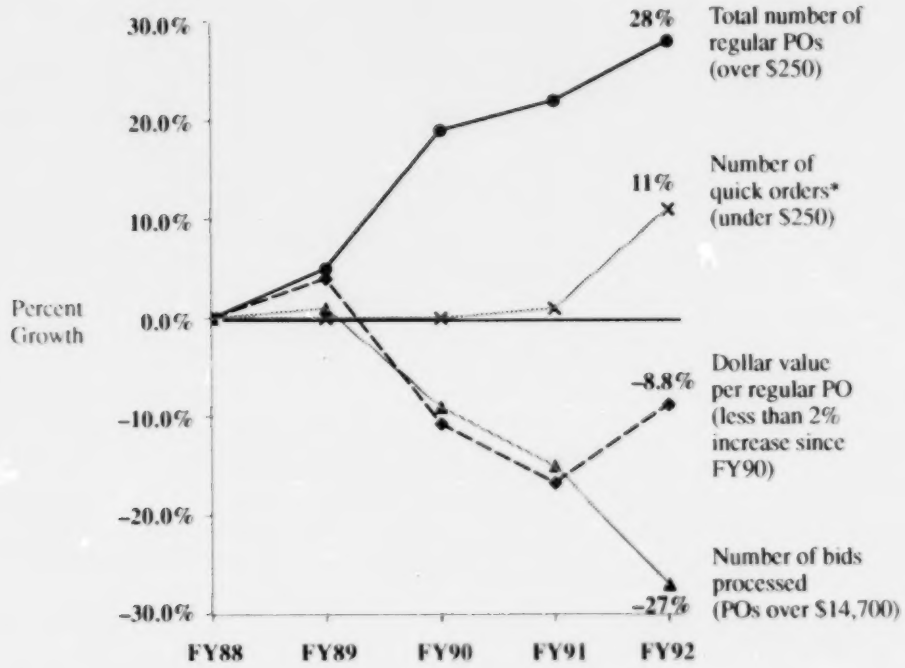
Source: Volume Analysis

the department with a question. An automated system would fundamentally change customer relations by providing online submission of POs, automated acknowledgments, and online inquiries into the status of a PO at any time. Routine questions could then be answered by the customer. In addition, staff in the department would have the tools and data needed to support their customers with informed responses to technical or more complex procedural inquiries on a timely basis.

- *Lost Savings in Contract Arrangements and Blanket Purchase Orders*: In the original system there was no automated tool to track the dollars spent with each vendor, on a particular contract, or on a particular commodity. This type of data was, of course, critical to negotiating contracts for volume discounts or special terms. With an automated system, the university would have this data readily available and online, potentially leading to hard dollar savings, as the university almost certainly would be in a position to consistently negotiate more favorable contracts.

Procurement and Contracting staff were doing more with less and these increases were not sustainable on a long-term basis without fundamentally changing the operation and systems in the department.

Exhibit 41.
Growth or Decline in Purchase Orders, Quick Orders, and Bids Processed



Base Year for Comparison is Fiscal Year 1988.
** Quick Orders were introduced in Fiscal Year 1990 and therefore have a base year of FY90 for comparison.*
Source: Volume Analysis

- *Significant Increase in Processing Workload Created Increased Stress:* Exhibit 42 is similar to exhibit 41 presented earlier, except that PO processing volumes have been divided by FTE employees. The bold, solid line shows that Procurement employees were processing 44 percent more POs than they were five years ago, despite the introduction of quick orders, which have absorbed nearly 60 percent of the volume of all purchase orders—a phenomenal increase. Furthermore, the average dollar value of a regular PO increased (the dashed line with diamond markers), reflecting an increase in the complexity, in addition to the volume, of orders. The increase in the departmental expenditures (the shaded, solid line) per PO was primarily due to additional funds allocated for the purchase and customization of a procurement system, although implementation had not been completed. Despite the increase in departmental expenditures, the cost of operating the department was only 0.009 cents per dollar spent—or less than 1 percent—which is quite low when benchmarked against peers.

Although these numbers appeared strong, they needed to be compared further with the personal toll they represented. Overtime had increased, and salaried workers who did not receive overtime were likewise spending many additional hours to get the work done. Given the current work processes, the purchasing department could not sustain this increase in workload, again helping to prove the need for change.

The procurement process had high costs of quality—due to the process complexity and lack of an automated system—that could be reduced greatly by BPR.

- *Significant Unnecessary Costs of Quality[18] (COQ) Expense:* The COQ in the Procurement and Contracting Department was an estimated $592,100 each year, of which an estimated $355,700 could initially be saved by reducing or eliminating costs of quality. The COQ includes approximately $243,600 annually that is the direct result of the lack of an automated purchasing system. These estimates demonstrated the need for a BPR effort.

Exhibit 43 shows the composition of the COQ within the department. The department faced a COQ of roughly half its operating expenditures, which is slightly more than that of most organizations beginning a COQ improvement effort. There were opportunities for cost savings in each of the categories, with the greatest potential for savings in the reduction of internal and external failures.

—Prevention Costs: Procurement's initial efforts toward quality improvement were apparent in the strong percentage (22 percent) of costs devoted to prevention. These efforts were attributable to the purchasing workshops, supplier meetings, and proactive planning time for personal computers and the systems project. While some of the prevention costs could be eliminated,[19] others would certainly be added.[20] Overall, these costs should be expected to marginally increase, while other costs of quality should decrease with future efforts.

—Appraisal Costs: With improved systems and operations, appraisal costs can be reduced through decreased time spent auditing contracts, maintaining accurate records, searching for files, or flagging suspicious requisitions.

—Internal and External Failures: These categories offered the greatest opportunities for improvement, accounting for more than half the costs of quality. This category included activities that were performed as a result of inadequate computing. With an automated system, many of these activities would actually disappear, including date stamping, logging in and out, sorting, counting, bursting, most filing, and typing terms and conditions. Each of these steps, at a minimum, could be automatically performed or, at best, could be rendered obsolete by the computer. In addition to direct savings from computer implementation, savings in these categories also include those related to the increased ease in responding to inquiries and resolving discrepancies.

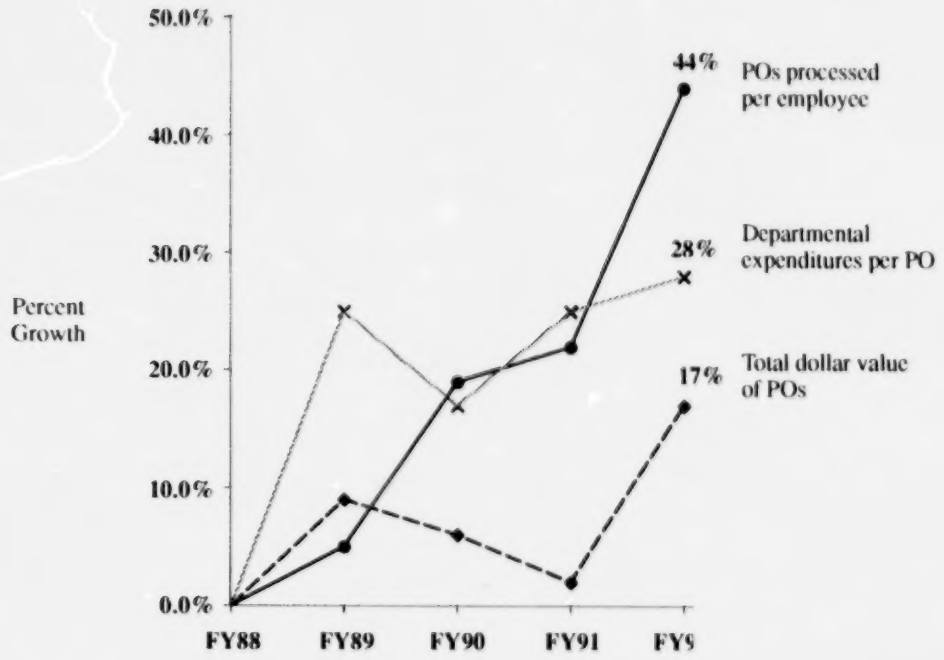
- *Low Proportion of Work Activities in High-Value, Technical Areas:* The pie chart in exhibit 44 depicts the distribution of work within the de-

18. The cost of quality analysis includes salary and fringe benefit costs only.

19. For instance, as customers become better educated regarding purchasing procedures, time spent in departmental workshops might be decreased.

20. For example, the department should publish a user-friendly, professional brochure to help customers better utilize the department's services.

Exhibit 42.
Changes in Workload in the Procurement and Contracting Department

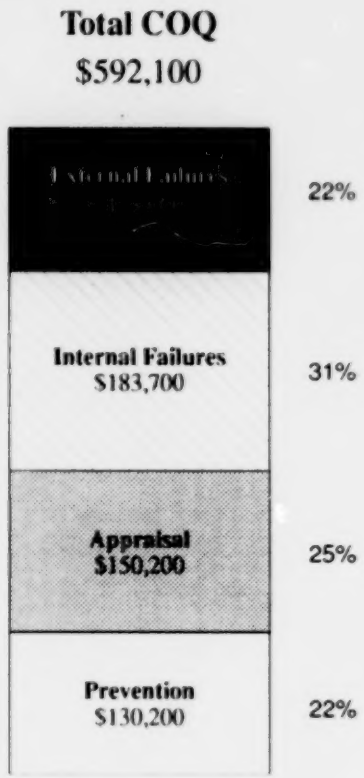


Base Year for Comparison is Fiscal Year 1988.
Source: Volume Analysis, ABC University.

Exhibit 43.
Cost of Quality — University Procurement and Contracting Department

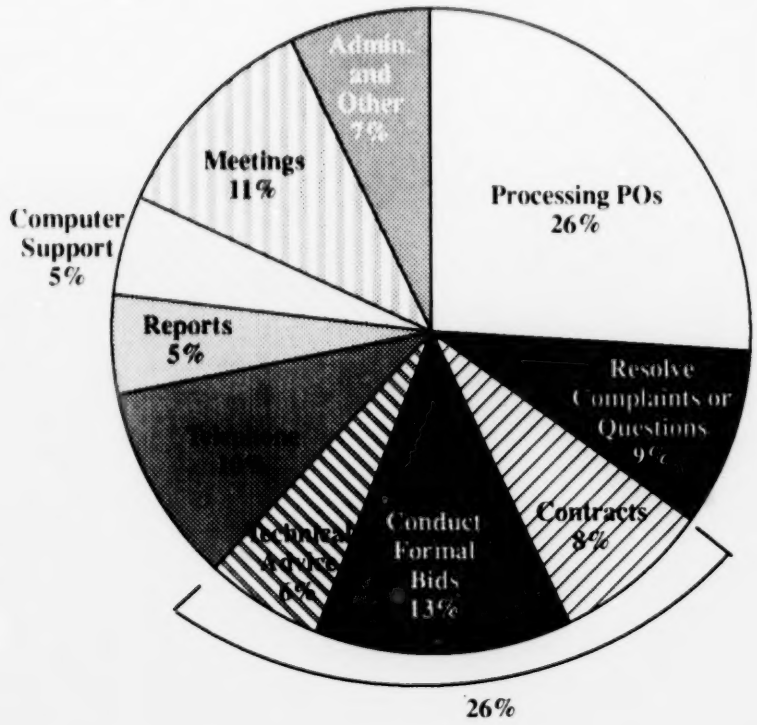
- **Internal and External failure cost examples:**
  - Unnecessary work and transfers due to inadequate computers, including: $141,700
    - Log in and log out POs ($20,500)
    - Gather statistics ($22,500)
    - File ($33,400)
    - Burst and distribute copies ($21,800)
  - Resolve complaints or confusion $124,200

- **Appraisal cost examples:**
  - Scan and sort POs $6,200
  - Audit contracts $76,500
  - Support third party audits $11,600



Source: Cost of Quality Analysis

Exhibit 44.
Work Distribution Analysis* — University Procurement and Contracting Department



**Percentages based on labor and fringe benefits costs*
Source: Work Distribution Analysis

partment. The pieces of the pie in which the department leveraged its professional and technical expertise fell roughly into the three bracketed categories adding up to 26 percent. Improved policies, systems, and operations were the essential keys to increasing these slices, while reducing the NVA slices related to processing paperwork, reporting, and resolving problems.

Recommendations and Results

The recommendations derived from the BPR analyses are summarized in exhibit 45. Procurement and Contracting needed the support of senior administration to cross departmental boundaries in addressing policy issues and to invest in systems for future improvements. The process presented earlier was riddled with redundant approvals and systems deficiencies. In the long term, by addressing these two key issues, the PO process could potentially resemble exhibit 46. This process relies on one approval before the PO is forwarded to the Procurement Department and then one additional approval while the Procurement Department processes the PO. The process also includes basic assumptions for electronic processing such as transmittal, date stamping, and record retention.

Streamlining the process will yield many benefits, including estimated COQ annual saving of up to $356,000. ABC can also expect to realize increased savings through improved use and negotiation of blank purchase agreements on an annual basis.

In addition to these quantitative results, ABC will gain several, more qualitative benefits. Faculty and staff at this institution were extremely frustrated under the system and spent unnecessary time tracking down purchase orders and running down other problems. The cost savings estimates do not include the savings realized by reducing the faculty and departmental staff time spent on resolving purchasing discrepancies. Department chairs will also be less frustrated by the maze of red tape that can indefinitely restrict budget expenditure. Additionally, the staff will be removed from the daily grind of routine paperwork and will instead be increasingly focused on value-added, more rewarding activities such as negotiations, bidding, and contract management.

BPR Summary

This analysis interplayed a variety of tools to build a case for change, documented the need for universitywide rather than departmentally based design, identified improvement opportunities, and developed a model for redesign. The most challenging part of this analysis was developing the comfort level among the management and staff to reexamine current operations and accept the need for change. Once members of management understood the analyses, they became the change champions. The most challenging part of implementation will be obtaining the strong commitment from senior administration.

Managing Facilities

Background

DEF is a medium-sized, independent, liberal arts institution in an urban setting in the Northeast, with two campuses approximately one mile apart. DEF had reached the end of a period of rapid facilities expansion and major construction. During this period, the facilities department's (also referred to as the physical plant department) staffing increased to manage the rapid and concurrent acquisition, construction, and renovation of space. As these major projects came to a close, DEF questioned whether the more stable "facilities maintenance mode" it was entering could be effectively managed with a smaller staff and a more streamlined approach to the delivery of physical plant services. DEF initiated BPR in response to the challenges of decreasing workloads, significant customer complaints, and increasing cost pressures. DEF's goal in initiating this process was to redefine the college's facilities services, organization, and processes. As will be revealed in the findings and conclusions, these were the right goals for BPR, but DEF also had several other important issues that had to be resolved before BPR could be successful.

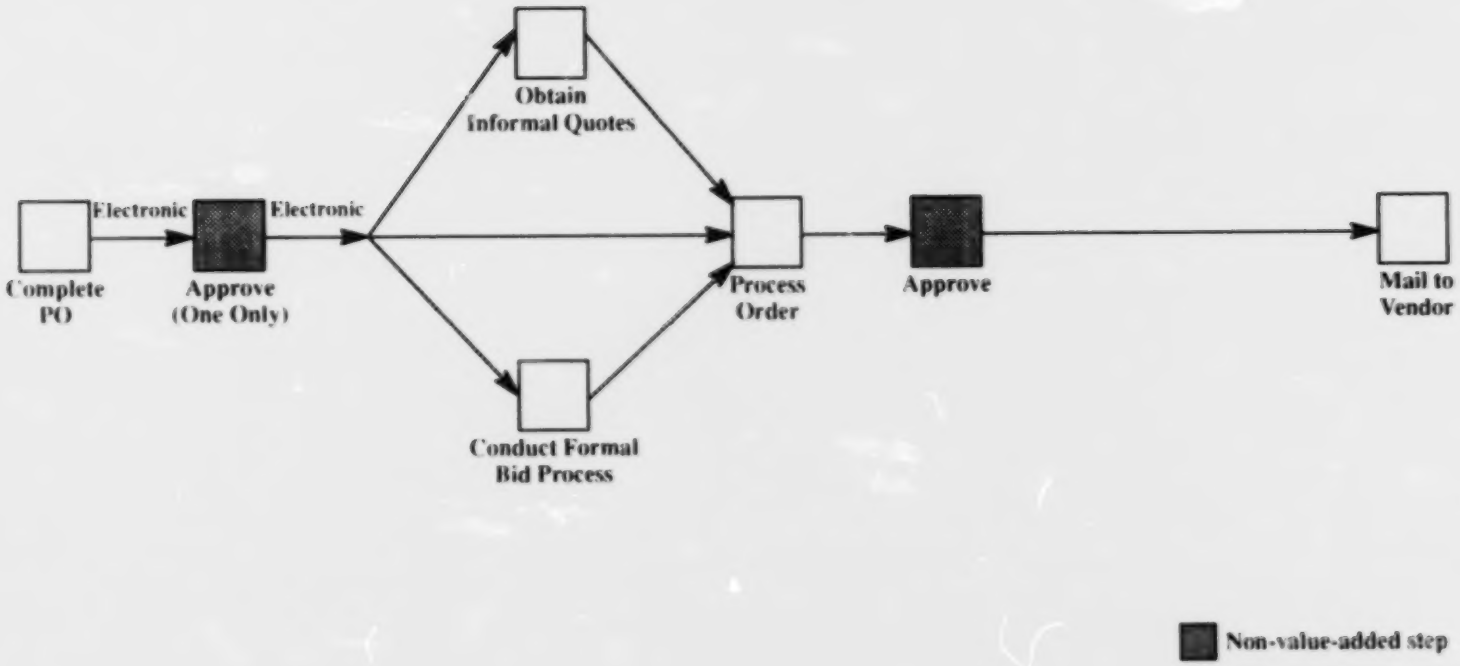
BPR Tools and Techniques Applied

Customer analysis, competitive benchmarking, volume analysis, work distribution charts, and cost of quality analysis were used to evaluate DEF's facilities management operations. Each tool fulfilled a specific purpose as defined below.

Exhibit 45
Procuring Goods — Recommendations and Results Table

Issue	Recommendation	Expected Benefits
Processing delays due to central approval policies	■ University-wide, senior management should evaluate the historical purpose and current need for each control ■ Unnecessary layers of controls should be eliminated ■ Authority should be linked with accountability and responsibility	■ Decreased delays, costs, and rework ■ Increased timeliness and customer satisfaction ■ Decreased bureaucracy
Quick order policy limits too low	■ ABC should analyze its purchase order (or alternatively invoice) activity to determine risk exposure at various dollar limits for Quick Orders ■ ABC's peers (both other universities and state agencies) should be informally surveyed to help determine acceptable limits.	■ Increased customer service ■ Increased ability to focus attention on high-risk, high dollar purchasing activity ■ Decreased workload for Procurement and Contracting Department staff
Void in management and operational data which is needed to support contracts and blanket purchase orders	■ ABC should first streamline university-wide approval policies and the purchase order process. ■ Then, ABC should invest to fully automate purchasing.	■ Dramatically increased customer service ■ Increased ability to manage purchasing operations according to hard data ■ Decreased staff time allocated to clerical activities ■ Potential for increased savings on contracts and blanket purchase orders with better data to support negotiating
Significant opportunities for cost of quality improvements	■ This issue would largely be addressed by: □ Streamlining approvals, □ Streamlining the PO process, and □ Improving systems as described above. ■ In addition, the Procurement and Contracting Department should undertake a focused effort to: □ Conduct customer analyses to proactively identify, address and cooperatively improve customer service issues □ Fundamentally re-think current paper process including filing, batching, sorting, approving, etc.	■ Dramatically increased customer service ■ Potentially reduced costs ■ Increased "rationality" to the workload ■ Focus on continuous improvement and evaluation

Exhibit 46.
Proposed Purchase Order Processing



Source: Process Flow Charting

- Customer Analysis:
  - Identified priority of services from the customers' perspectives
  - Quantified customer opinions about the current quality of services
  - Identified areas of greatest customer concern and frustration
- Competitive Benchmarking:
  - Identified areas of comparative under- or over-staffing, as well as under- or over-expenditures
- Volume Analysis:
  - Quantified the workload by type of trade (carpentry, plumbing, electrical, etc.)
  - Quantified historical accuracy of projections of workload for each trade
- Work Distribution Chart:
  - Quantified how staff members spent their time
  - Highlighted groups of activities that consumed considerable staff resources
  - Identified activities with greatest opportunity for improvement
- Cost of Quality Analysis:
  - Quantified percent of staff time and costs devoted to non-value-added activities
  - Contributed to understanding types of non-value-added activities
  - Quantified potential cost savings

In addition to the above analyses, several departmental managers and senior university officials were interviewed. Surveys were also distributed to supervisors and managers in the physical plant department to gain feedback on a variety of qualitative, management issues. The interviews and surveys helped to identify management issues, common employee frustrations, ideas for improvement, and barriers to change.

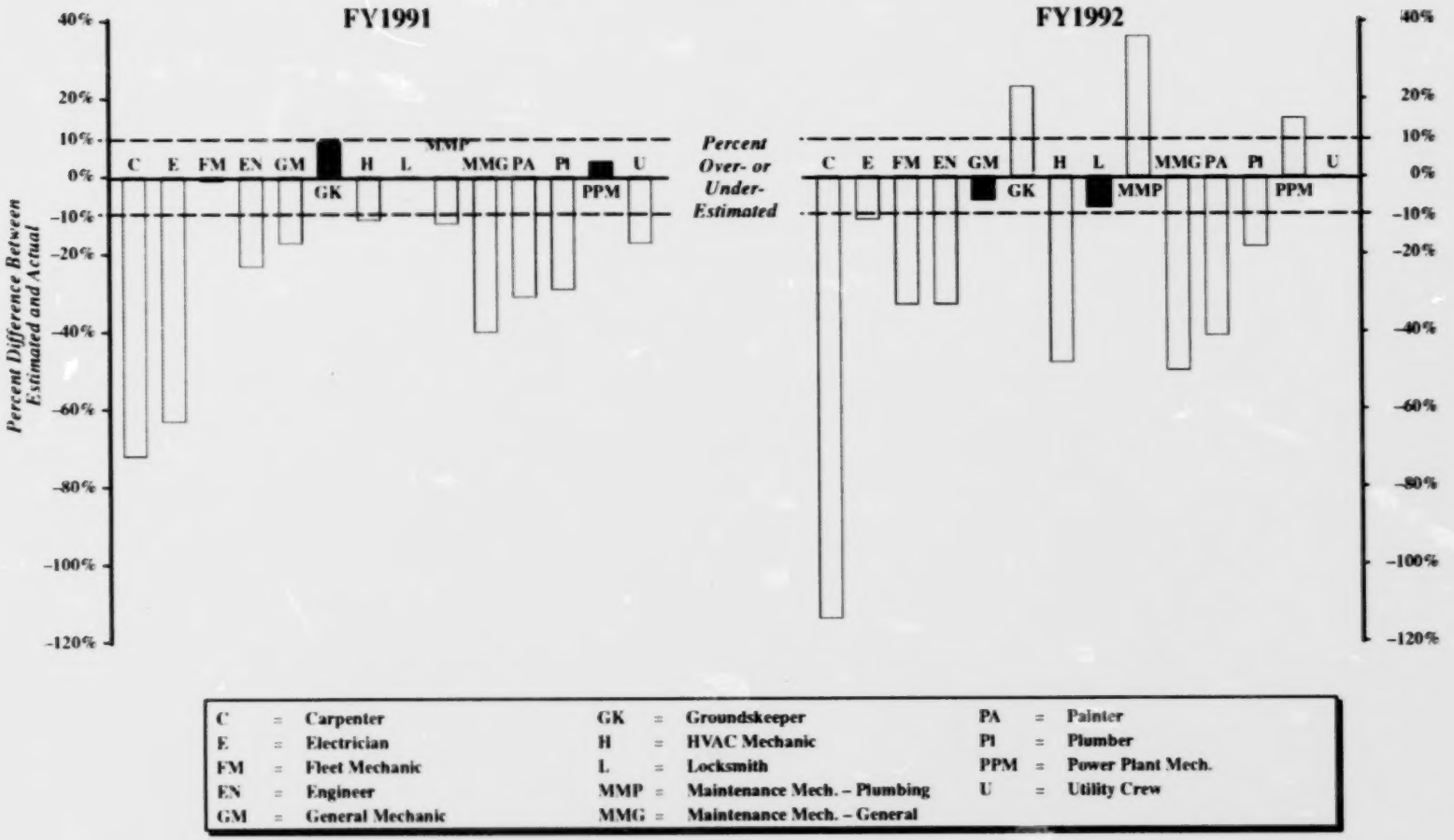
Findings and Conclusions

Application of the above BPR tools led to five major conclusions relating to the management of daily work requests, quality, organization, staffing, and planning. Each is presented and then is supported with details from the BPR tools.

The process to manage daily work did not fully leverage technology, a circumstance that impaired management information, diminished productivity, and ultimately increased costs.

- *Lack of Reliable, Critical Management Information:* While the existing workorder computer system did track workorders, it did not estimate labor hours or support inventory management. Instead, the labor hours required for each workorder were roughly estimated by the desk clerk, and no estimates of required materials were included. Using volume analysis, the chart in exhibit 47 displays the accuracy of these labor projections over a two-year period. The estimates fell within 10 percent of the overall actual hours for only four of the fourteen trades shops (e.g., carpentry, electrical, etc.) in FY91 and just three in FY92. On average, the estimates were 20 percent off. These were critical management statistics used to determine labor requirements, daily schedules, work prioritization, and the management of customer expectations. It was essential that these estimates be more accurate in the future as part of the process redesign.
- *Missing Modules Reduced Productivity:* The work distribution analysis showed that staff members spent approximately $71,000 (in salaries and benefits) annually either to initially obtain parts, tools, and materials or to go back to the stock room to get those that were omitted on the first job-site repair attempt. If an estimation module were to be built into the computer system that listed the parts and materials that were required for each workorder, it would reduce staff time and costs associated with determining and obtaining parts. It would also reduce the total elapsed time needed to complete a job by reducing multiple trips to the stockroom.
- *Inefficient Paper Processes, Unnecessary Rework, and Insufficient Information Increased Costs:* Process flowcharting showed that insufficient use of technology also affected the department's chargeback process. The department's administrative coordinator tracked all physical plant budgets and authorized budget transfers for work performed by the department. This individual had the responsibility, accountability, and authority for these transactions, yet was not authorized to enter them into the university's computer system. Instead, the coordinator completed time-consuming paper forms and sent them to the treasurer's office for data entry. Data entry should have resided with the "source of information" (coupled with routine

Exhibit 47.
Department of Physical Plant
Historical Accuracy of Workorder Estimates by Trade Shop



Source: Data generated by DEF University's Work Order System and evaluated with Volume Analysis tool.

audits and electronic controls). Compounding this problem, physical plant did not have "read only" access to the general ledger, as did other departments. The department managed such large budgets that it could not operate without this information; therefore it tracked duplicate budget information on its own database, which was also discovered as part of process flowcharting. Clearly, this shadow system was both non-value-added and an inappropriate use of resources.

Physical plant had very high costs of quality and low customer ratings on quality, indicating a need to re-focus the department on service delivery and efficiency.

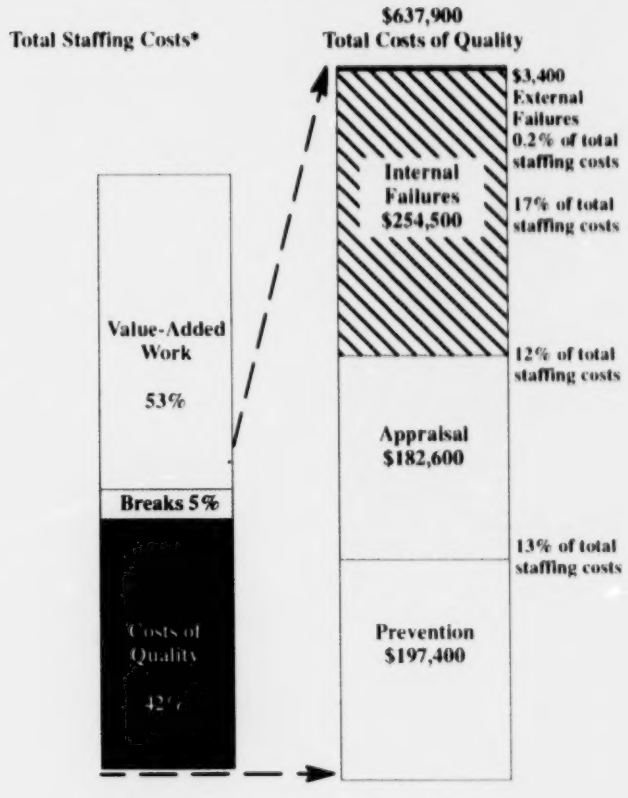
- *High Costs of Quality Primarily Due to Internal Failures:* Based on cost of quality analysis, exhibit 48 displays the current distribution of staffing costs within DEF's physical plant department. As shown in the left column, 42 percent of staff costs were consumed by non-value-added activities. These activities could be further segmented by the four cost of quality (COQ) categories presented in the right column. The greatest opportunities were found in reducing the internal failures and appraisal costs within the department.

  For example, the issues mentioned earlier regarding inefficient work scheduling, estimating time and materials, obtaining parts, and entering duplicate data all contributed to the costs of internal failures. Just traveling to and from job sites accounted for $148,900 of staff costs each year, which could be reduced through improved scheduling and planning. Exhibit 49 details other examples of the factors that contributed to these high costs of quality.
- *Low Customer Ratings*: Despite spending a considerable sum to compensate for poor quality, customers were still not satisfied with service quality. Customer analysis showed that the highest quality rating for all of physical plant services was a 4.5 (1 being excellent, 10 being poor), with most services rating between 4.5 and 6.0, as shown in exhibit 50. The most troubling ratings were for custodial services and telecommunications. These two services received the highest ratings in terms of priority to the customer, but the lowest ratings for quality of service. Furthermore, these services were also among the most frequently evaluated by customers, implying that the services affected most of the university community.
- *Poor Customer Communication and Quality Management*: Physical plant did not proactively identify and address customer and quality needs. Three types of communication were lacking: "up-front," "ongoing," and "after-the-fact." Customer focus group participants expressed a desire for a greater sense of partnership with physical plant to proactively identify and solve problems up front. Customers wanted more reliable advance notice of plant-related actions that affected their work environment. They also wanted ongoing updates as to the status, schedule, and costs of work. Finally, follow-ups were not conducted after work was completed. No customer evaluations were solicited, or for that matter incorporated into performance reviews or departmental planning.
- *Services and Organization Confused Customers*: The organizational chart for the division of administrative services, which included the physical plant department, is presented in exhibit 51. Several services that customers expected to find in physical plant were in fact managed elsewhere at DEF. For instance, the "utility crew" handled all moves, event setups, and snow removal (typical for physical plant) yet reported outside the physical plant organization. Custodial services (a vendor contract) was also managed by a non-physical plant manager at DEF. Pest control, usually closely tied to custodial services, was handled by the telephone bill administrator. These were each frequently used facilities services, yet they were not provided by the physical plant department. Customers were bewildered about whom to call for various services. Through further customer analysis, DEF needed to clearly define what the core processes of each unit should be, and then needed to align the organization to manage those processes to meet customers' needs.

Physical plant and the larger division of administrative services were overstaffed at the senior levels but were not overstaffed at the worker levels, except in groundskeeping, according to peer benchmarks[21] and volume analysis.

21. Association of Physical Plant Administrators.

Exhibit 48.
Cost of Quality Analysis, DEF's Department of Physical Plant



* *Costs include staff salaries and benefits. Numbers may not sum due to rounding.*

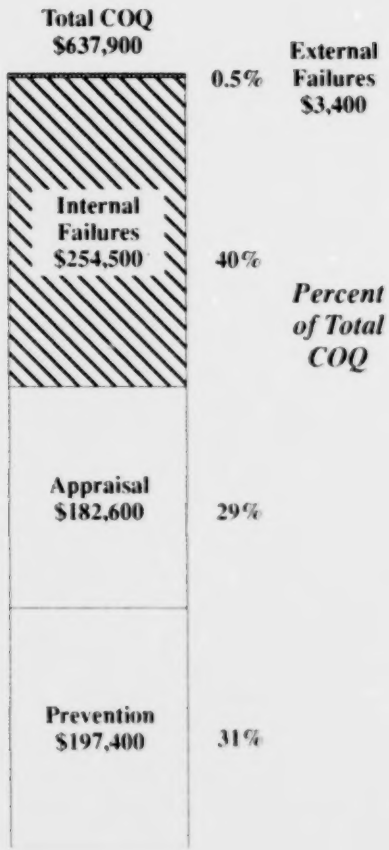
Source: Cost of Quality Analysis, DEF University

- *Overstaffing at Senior Levels*: Two senior managers focused on major construction planning and two other managers focused on detailed management of ongoing construction projects. With little to no future construction activity, only one manager needed to focus on overall facilities planning and one second manager could handle detailed project management. Furthermore, responsibilities for both long-term planning and the management of ongoing operations in physical plant were not clearly defined among the three layers of management: vice president for administrative services, physical plant director, and physical plant assistant director. Given the reduced level of construction activity, DEF needed two, not the current three, levels of management to supervise planning and ongoing operations. DEF needed only one layer focused primarily on master facilities/overall planning and then just one second layer focusing on internal operations. These types of management and "turf" issues had to be resolved before BPR could be successful.
- *Isolated Overstaffing at Worker Level, Some Questions in Benchmark Data*:[22] The benchmark data

22. This comparison was done using preliminary, draft data obtained from the APPA 1991–92 *Comparative Cost and Staffing Report for College and University Facilities.*

Exhibit 49.
Detailed Cost of Quality Examples,* DEF's Department of Physical Plant

■ Internal failure cost examples:	
□ Await schedule or work assignments	$28,100
□ Travel time	$148,900
□ Go back to get additional or different parts	$39,700
□ Accounts receivable adjustments	$7,900
□ Negotiate union grievances	$5,800
■ Appraisal cost examples:	
□ Complete workorder paperwork	$37,400
□ Inspect equipment and buildings	$6,100
□ Determine parts and tools needed	$30,800
□ Complete time cards	$18,800
□ Inspect and approve completed work	$15,700
■ Prevention cost examples:	
□ Schedule tradesmen	$28,000
□ Training	$20,300
□ Meetings	$17,900
□ Develop specifications	$10,600
□ Project planning and scheduling	$6,200
□ Support universitywide planning	$7,000



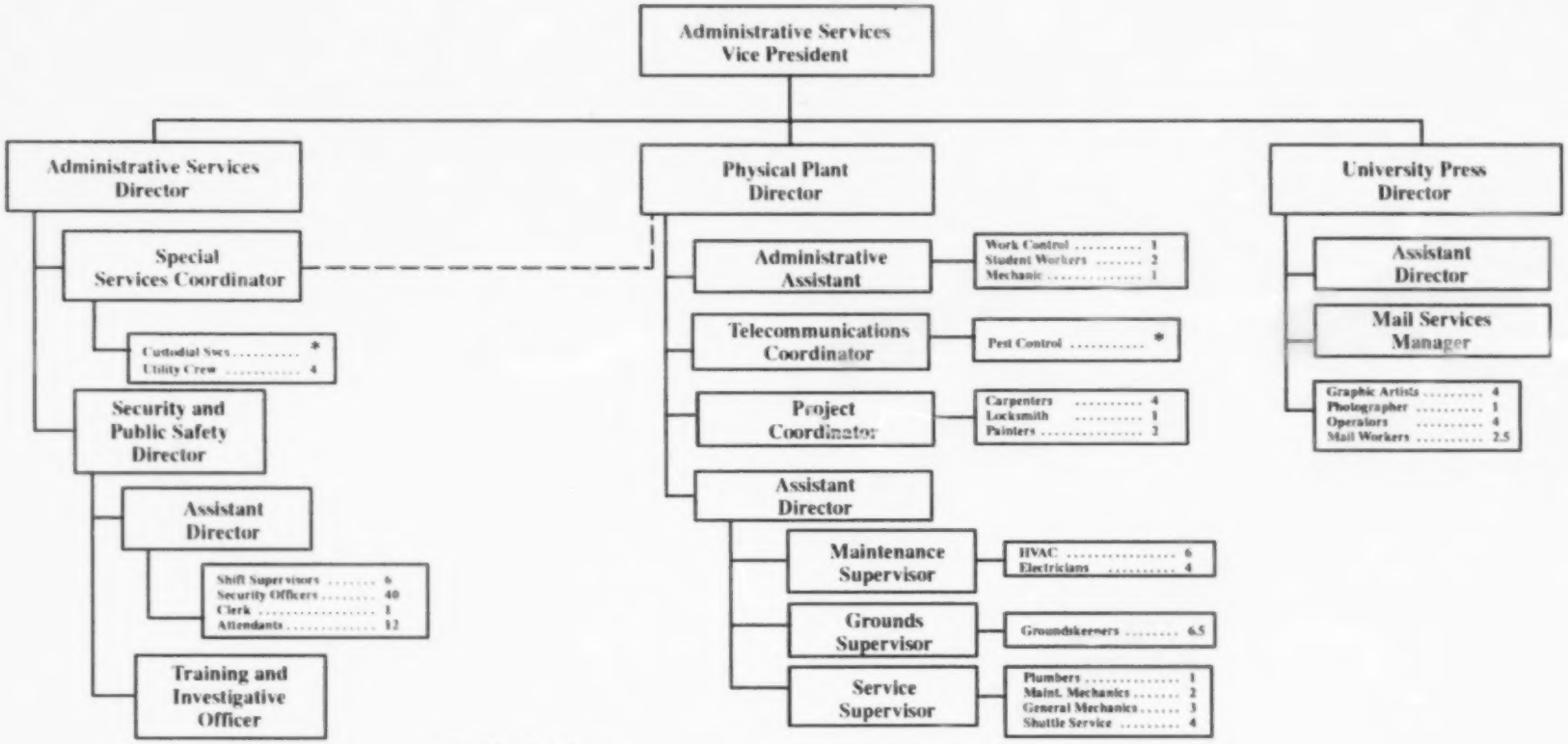
* *Costs include staff salaries and benefits*
Source: Cost of Quality Analysis

Exhibit 50.
DEF's Physical Plant Department Customer-Analysis Summary*

Service	Service Quality Average Rating (1 = excellent, 10 = poor)	Priority Rank of the Service
Physical Plant:		
Groundskeeping	4.5	5
Vehicle Provision	4.6	—
Vehicle Maintenance and Repair	4.9	9
Pest Control	5.4	8
Facility Maintenance and Repair	5.7	5
Moving/Utility	5.7	3
Construction Planning and Management	5.8	5
Receiving	6.0	4
Custodial Services	6.2	1
Telecommunications	6.7	2

Source: Customer Analysis

Exhibit 51.
Administrative Services Division of DEF University
Organization Structure, Current



* = *Vendor Contract*

Source: DEF University Organization

disaggregated staffing positions according to the following categories: building maintenance, custodial, and groundskeeping, each of which is discussed below.

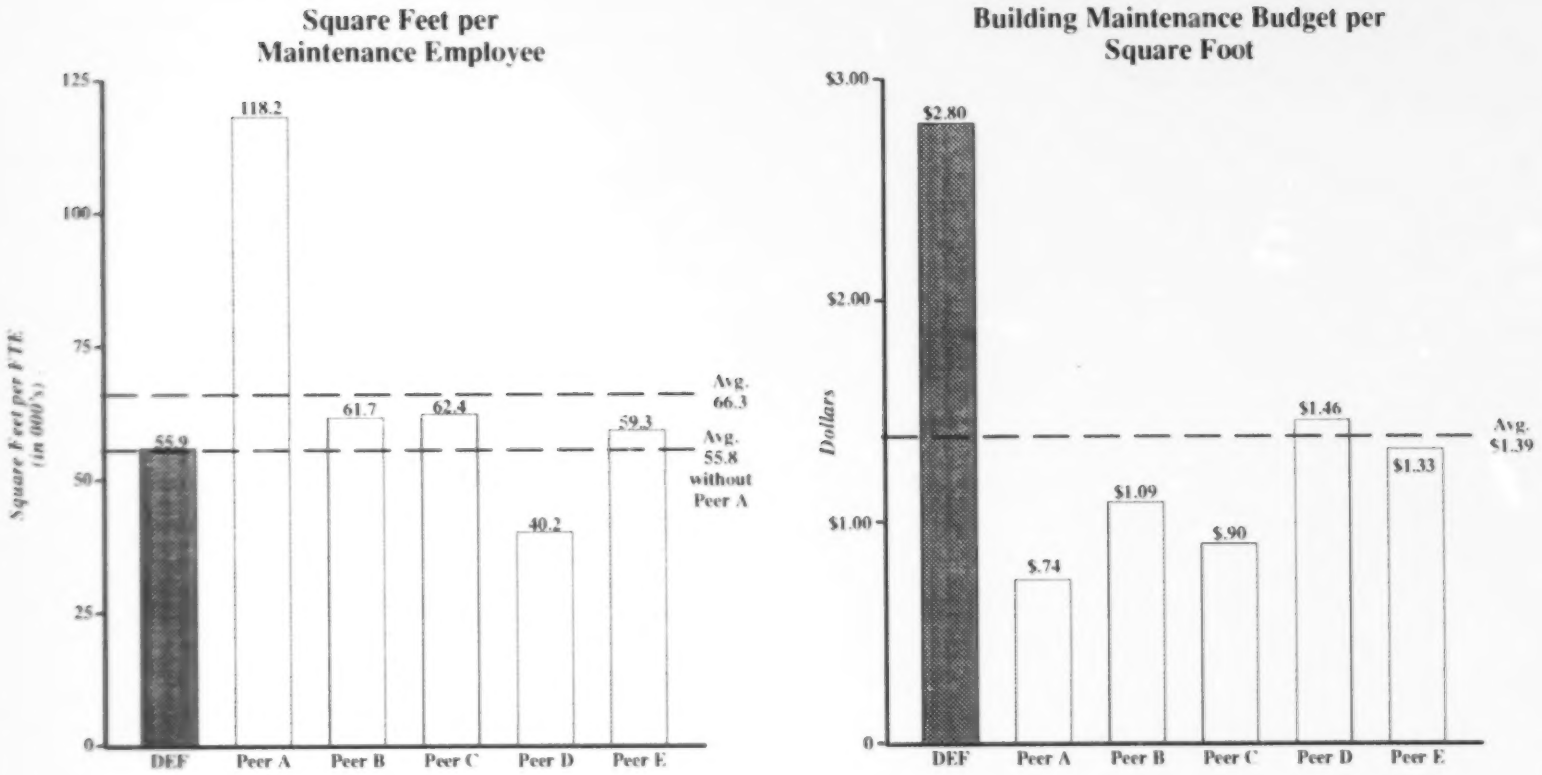
- *Building Maintenance:* Using the benchmark data, DEF was roughly comparable to its peers in terms of the proportion of total plant staff devoted to building maintenance (25 percent at DEF compared to a 22 percent peer average). As presented in exhibit 52, DEF's ratio of building square feet to maintenance worker was somewhat below the peer average. If Peer A, which appears to have anomalous data, was eliminated from the average calculation, then DEF's ratio was almost exactly equal to the new average (55,882).

  While DEF had an average building maintenance workload, the budget per square foot was troublesome, as shown in exhibit 52. The benchmark data presented in exhibit 53 also showed that DEF's maintenance budget was significantly greater than its peers, both in absolute terms and as a percent of the total departmental budget. Either DEF's maintenance expenditures were wildly out of control, or the data were inconsistent. Most likely, DEF had included the costs for major capital expenditures in these data, although peer institutions had not. As discussed in the benchmarking section in chapter III, this is an example where comparability had to be established before using the data; DEF needed to further investigate the issue.
- *Custodial Services:* DEF compared very well with its peers on a cost-per-square-foot basis, as well as in regard to the number of square feet maintained by each custodial worker, as shown by the top two charts of exhibit 54. However, the relatively low cost of the vendor needed to be weighed against the unusually large number of negative comments received in the customer analysis with respect to housekeeping services.
- *Grounds:* DEF dedicated more resources to groundskeeping than its peer group average. The bottom two charts of exhibit 54 show that grounds employees maintained fewer acres than the average, and costs per acre exceeded the group average. However, because groundskeeping was highly dependent on the nature of the campus (rural versus urban), DEF needed to expand the peer group comparison to reflect these differences before considering staffing-level decisions. This was another example showing that compatibility is an important issue, as discussed in the benchmarking tool of chapter III.
- *Volume Analysis Showed Steady Backlog for Worker Level:* Using volume analysis, the workorder system backlog data also indicated that physical plant was not overstaffed at the worker level. The lightly shaded bars in exhibit 55 depicted current workorder system backlog estimates (in days) for each trade. If the historical inaccuracies of these estimates were incorporated by trade, the backlogs would actually increase substantially.

Most importantly, the lack of clearly articulated, well-understood universitywide goals and plans forced physical plant to respond to ad-hoc directives from a wide variety of constituencies, reducing efficiency and increasing costs and frustration. This was a fundamental management issue that had to be addressed for BPR to be successful.

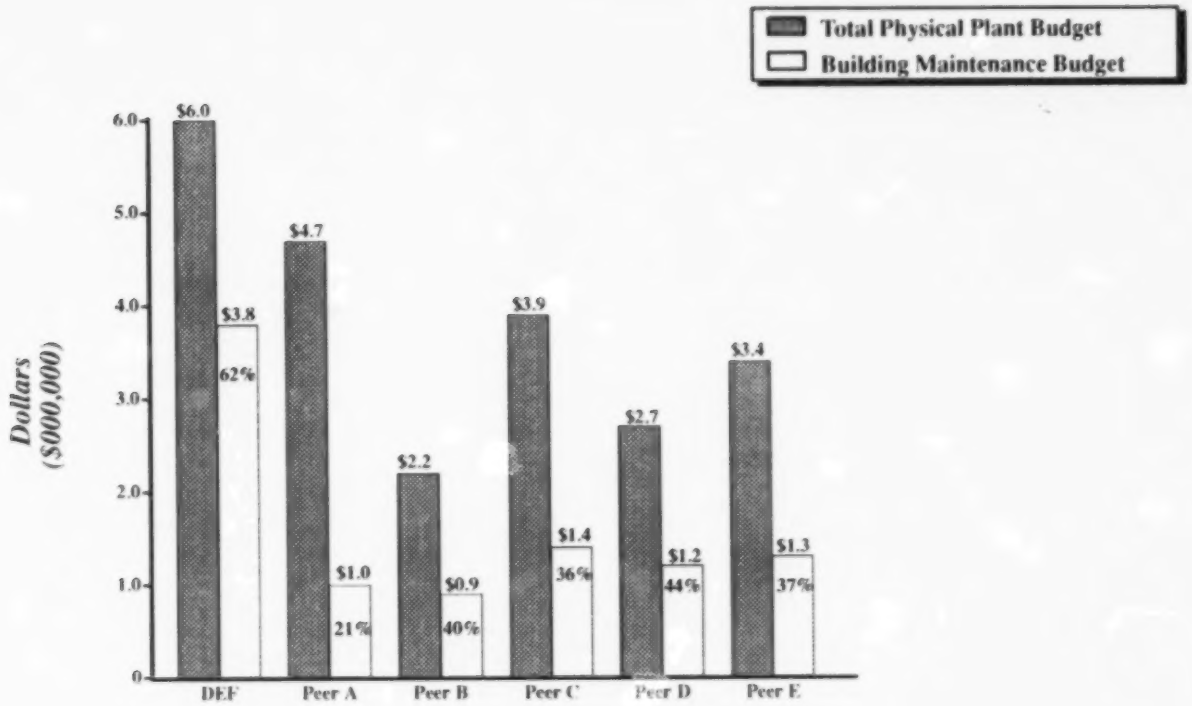
- *Lack of Input from Departmental Managers:* The work distribution analysis indicated that out of 46 physical plant employees, only one-tenth of one full-time-equivalent (FTE) employee's time was spent supporting universitywide strategic and capital planning, proving that the department did not play a critical role in influencing universitywide plans that significantly affected its own operations. The director of physical plant was not included in the senior administrative and board of trustees meetings where major capital expenditures and maintenance program priorities were established for the next fiscal year.
- *No Linkage Between Strategic Planning and Capital Budgeting:* At DEF, senior administrators could decide to pursue a renovation or construction project without a specific funding or implementation plan. For example, DEF decided in late April to pursue a $1.3 million summertime construction project (a food court) in its student center. Most major construction projects require two years for the entire planning-construction-completion cycle.

Exhibit 52.
APPA Peer Data Benchmarks
Employee Productivity and Budget in Building Maintenance



Sources: Based on preliminary, draft APPA data for FY1992.
Benchmarking Analysis

Exhibit 53.
APPA Peer Data Benchmarks, Total Physical Plant Department Budget Compared to Building Maintenance Budget

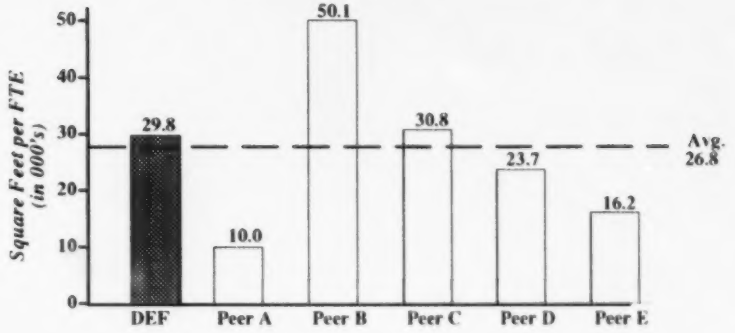


Source: Based on preliminary draft APPA data for FY1992 Benchmarking Analysis

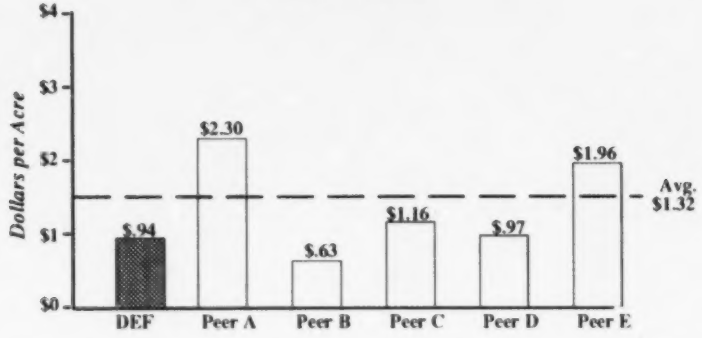
Exhibit 54.
APPA Peer Data Benchmarks, Employee Productivity and Budget

Custodial

Square Feet per Custodial Employee

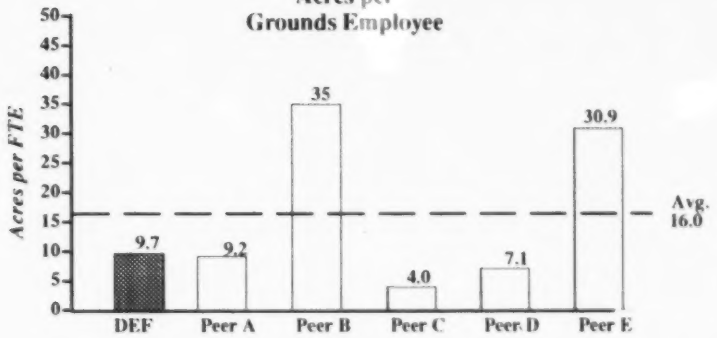


Custodial Budget per Square Foot

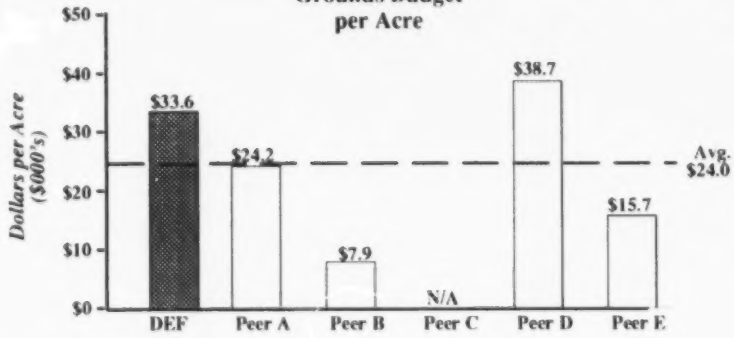


Grounds

Acres per Grounds Employee

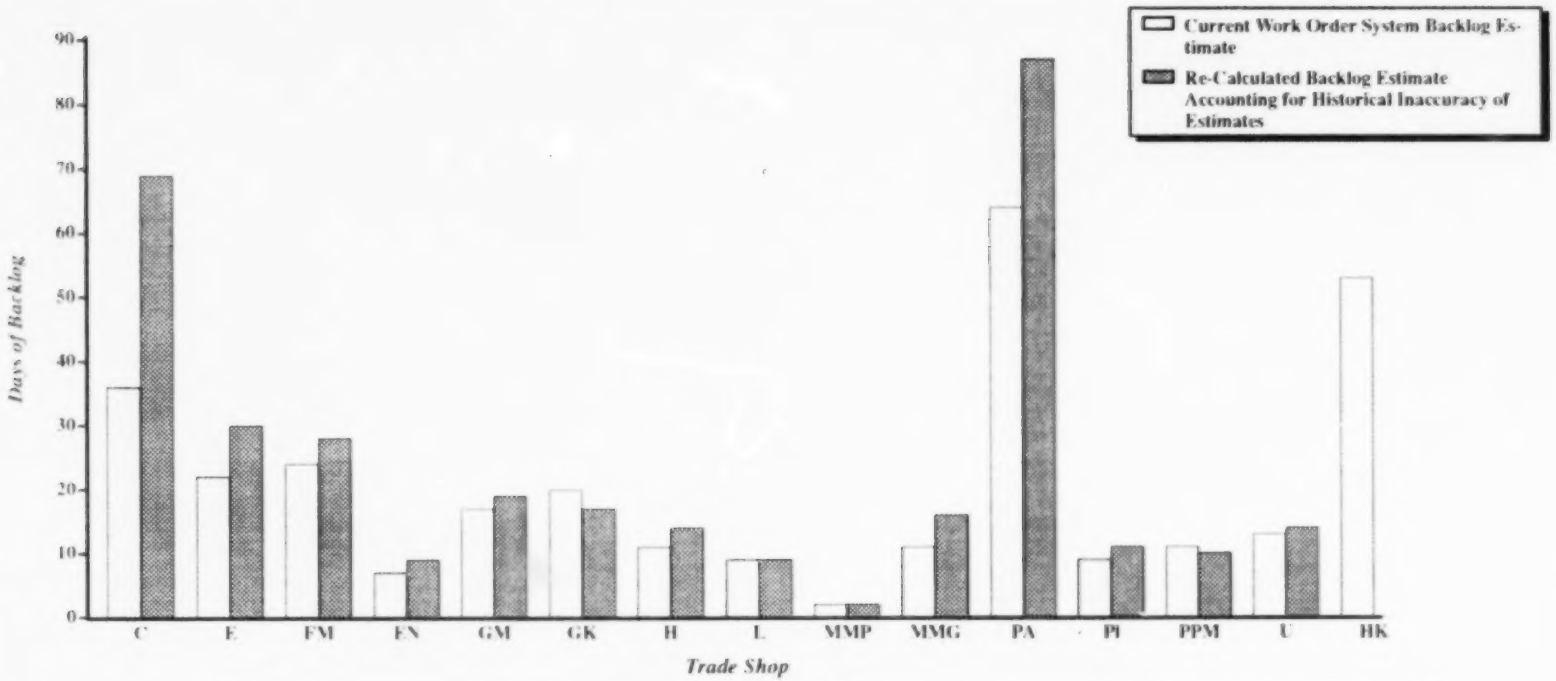


Grounds Budget per Acre



Source: Based on preliminary draft APPA data for FY1992. Benchmarking Analysis

Exhibit 55.
DEF University's Physical Plant Department
Estimates of Current Work Backlog by Trade



C	=	Carpenter	GK	=	Groundskeeper	PA	=	Painter
E	=	Electrician	H	=	HVAC Mechanic	PI	=	Plumber
FM	=	Fleet Mechanic	L	=	Locksmith	PPM	=	Power Plant Mech.
EN	=	Engineer	MMP	=	Maintenance Mech. – Plumbing	U	=	Utility Crew
GM	=	General Mechanic	MMG	=	Maintenance Mech. – General	HK	=	Housekeeping

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Source: Data generated by DEF University's Work Order System and evaluated with Volume Analysis tool.

In this case, architectural drawings began in late April (upon budgetary clearance to proceed), demolition began in mid-May, and construction began June 1, with a desired completion date of September 1. Demolition began without a permit because drawings had to be completed before a permit could be issued. Orders for "long-lead" items (e.g., stainless steel kitchen equipment, ventilation fans, HVAC) were placed May 1st, before plans were completed. During the course of the project, architectural drawings and plans were being completed just one to two days ahead of the actual construction. In the end, the project ran approximately one-quarter of a million dollars over budget, primarily due to the lack of planning and the demand for overtime in order to complete the last-minute project on deadline.

- *Shifting Institutional Priorities Skewed Departmental Plans*: Department heads formulated annual and five-year plans for their operations. The process by which these plans were established was logical and potentially effective; however, unanticipated projects, such as the food court example discussed previously, often emerged with little advance warning, disrupting the planning and scheduling of ongoing work.

Recommendations and Results

As the reader may have noticed, the issues for this institution were somewhat different than the issues raised for the other institutions considering BPR in these case studies. The issues of senior management overstaffing, an inappropriate organizational structure, and a destructive lack of coordinated institutional planning indicated that this institution was not ready to proceed to the redesign phase of BPR. The institution needed to first address serious issues of senior organizational structure and leadership, as these issues were more significantly affecting operations than the actual work processes. Thus, a full BPR effort could not be effective until these issues were resolved and the university had an effective change champion to drive the radical redesign. The recommendations for this institution are summarized in exhibit 56.

In this case, the diagnostic phase of BPR pointed out substantial organizational and governance issues that needed to be addressed before real redesign work could begin. The recommendations that follow focus on these management issues. In addition, two recommendations are offered that reflect "quick fixes" that would improve the current situation and support a future completion of the BPR work.

BPR Summary

This case study showed that an institution must be ready and fully committed to BPR at its most senior levels for the effort to be successful. The case study employed analytical tools from the diagnostic phase of BPR to prove the need for a different, or "non-process," type of change before completing BPR. The most challenging part of this analysis was delivering an unexpected message to management and the board of trustees. Expecting recommendations focused fully on BPR, they received a very different, but equally important, plan for improvement. Once this institution addresses these important issues and has a change champion on board, it will be an excellent candidate to complete the redesign process. The work processes and especially customer service can be improved significantly through the completion of BPR, ultimately reducing annual operating costs for the institution.

Admitting Undergraduate Students

Background

GHI was a large, state research university with 35,000 undergraduate and 13,000 graduate students. The university had three geographically dispersed campuses that were at least a one- to three-hour drive apart. Each campus served a unique student profile and regional community; therefore each had its own admissions office which reported centrally to one assistant vice president for admissions. The main campus had eight undergraduate colleges, three of which focused on liberal arts education. The other campuses each had one undergraduate college, plus three professional schools across the two campuses. Graduate admissions were handled primarily by the individual academic departments on each campus.

GHI initiated this BPR diagnosis in response to state budget cuts, customer frustration, and increasing workloads that were exceeding staff capabilities. The goal of the BPR project was to

Exhibit 56.
Managing Facilities — Recommendations and Results Table

Issue	Recommendation	Expected Benefits
Inappropriate organizational placement of several Physical Plant-related services	■ Move financial aspects of Telecommunications to Treasurer's Office and technical aspects to Computing ■ Have Utility Crew and Custodial Services report through Physical Plant ■ Have Pest Control be included in the vendor contract for Custodial Services or managed as part of Physical Plant	■ Increases focus on core services ■ Increases flexibility in work assignments and appropriately aligns core services ■ Increases linkage among authority, accountability, and responsibility for important Physical Plant services
Overstaffing at senior management levels	■ Eliminate position of Vice President for Administrative Services; consolidate this area with the financial services to create one Vice President for Finance and Administration ■ Eliminate the position of Director of Administrative Services ■ Eliminate the position of either Construction Project Coordinator or Assistant Director within the Physical Plant Department, in response to decreased construction ■ Further investigate benchmark data where data issues exist	■ Right-sizes the senior staffing levels for an institution of this size and complexity ■ Responds to the dramatic decrease in construction activity
Lack of institution-wide planning and communication	■ Formalize and institutionalize a planning structure which includes greater managerial and customer input ■ Develop a plan to communicate university-wide goals and initiatives, both short-term and long-term ■ Develop alternate funding strategies or accounting arrangements to accommodate cross-fiscal-year construction projects	■ Addresses desperate need for greater institutional planning ■ Decreases ad hoc major requests of Physical Plant Department which impair daily operational efficiency ■ Incorporates key players into planning process ■ Reduces project delays and cost overruns due to poor planning
Ineffective use of technology in work management processes	■ Upgrade system to newer version of software ■ Install inventory management and estimation modules; increase reporting capabilities ■ Authorize Department Administrator to enter chargeback directly into system ■ Provide Department with on-line, read-only access to financial system	■ Improves scheduling, prioritization, and work management capabilities ■ Improves critical management information ■ Increases ability to manage productivity ■ Reduces paperwork and rework in Departmental financial transactions
High costs of quality and low customer satisfaction	■ Utilize system upgrades to reduce costs in internal failure categories ■ Institute proactive customer communication plan ■ Develop user-friendly Departmental Customer Service Guide ■ Streamline work order processing once organizational and systems issues are resolved ■ Reconsider vendor contract for Custodial Services	■ Improves customer satisfaction ■ Partnership approach to customers ■ Reduces costs due to poor internal work structures ■ Potential to improve customer satisfaction with Custodial Services; increase partnership approach with vendor

rationalize and streamline the admission process to cost-effectively meet the applicant's needs and expectations while respecting the programmatic and cultural differences of the three campuses and several colleges.

BPR Tools and Techniques Applied

Process flowcharts, workload volume analysis, non-value-added assessment, work distribution charts, and cost of quality analysis were used to evaluate GHI's admission process. Each tool fulfilled a specific purpose as defined below.

- Process Flowcharts with VA/NVA assessment:
  - Quantified the average cost of processing an undergraduate application and identified the drivers of these costs
  - Quantified the costs attributable to specific policy decisions
  - Identified and quantified the effects of non-value-added process activities
  - Quantified the total elapsed time from the day a student filed an application to the date the student was notified of a decision
- Workload Volume Analysis:
  - Highlighted the changes in workload over time
  - Helped to prove the need for change
  - Identified the effect of policies on the number of applications which had to undergo a more complicated review process
- Work Distribution Chart:
  - Quantified how staff spent their time
  - Highlighted groups of activities that consumed considerable staff resources
  - Identified activities with greatest opportunity for improvement
- Cost of Quality Analysis:
  - Quantified percent of staff time and costs devoted to non-value-added activities throughout the department
  - Contributed to understanding types and reasons for non-value-added activities
  - Quantified potential cost savings

In addition to the above analyses, several departmental managers were interviewed and specific consideration was given to a recent internal study that analyzed the current admission requirements for each undergraduate college. The interviews and internal documents brought insight to the unique considerations for each undergraduate college, employee and management issues, applicant complaints and frustrations, past improvement efforts, and future plans for improvement.

Findings and Conclusions

Four major conclusions were drawn from the application of the above BPR tools. The conclusions focused on consistent policies and admission requirements, automation, workload and quality, and the university's interaction with its students. Each conclusion was supported by details derived from the BPR toolkit.

A key university policy that allowed the liberal arts colleges on the same main campus to establish distinct admission requirements increased costs of recruiting students and diluted the overall effectiveness of the admissions office.

Three of the colleges on the main campus were liberal arts in focus, offered the same courses, and used the same faculty. They differed only in their graduation requirements and residential college culture. The policy to maintain unique admission requirements was based on history[23] and was no longer relevant (or should no longer have been a driving force in the policies), created major processing complexities, and increased costs significantly. The admissions office had no direct control over these policies, yet the policies had major effects on the office's operations and effectiveness. As part of visioning, the redesign had to address these policies to rationalize and simplify the process. Implications of the existing policies included:

- *Significant Rework and Costs in the Review Process:* One student could apply to several of the undergraduate colleges, each with different admission requirements. Thus, an admission officer had to individually review the student's application for each of the multiple colleges to which he or she applied. Furthermore, for marginal candidates, a complex committee review system required that several different committees review the application, depending upon the qualifications of the student and the number of GHI's colleges to which the student applied.

23. Ten years ago, the colleges each had their own faculty and each offered their own courses.

These policies had real dollar implications. Based on the work distribution chart analysis, the admissions office dedicated over $98,000 each year[24] to make these "multiple college" (but same campus) decisions. Furthermore, process flowcharts and cost estimates showed that although the cost of processing an application with one review was only $7.21, the cost to process the same application through a committee review tripled to over $23, as summarized in the table in exhibit 57. These cost estimates were extremely important in convincing university leadership of the need to change.

24. Costs include salary and benefits expenses for the employees who "touch" the transaction (work on it in some way).

- *Time-Consuming, Non-Value-Added, Multiple Committee Reviews*: The flowchart in exhibit 58 displays the original application process flow and confirms the areas of opportunity. The unshaded, clear boxes indicate steps that directly contributed to the "output" of this process (an admission decision), such as opening the application, creating a computerized index number, and reviewing the file. If an application followed only the clear boxes, it could achieve the desired output: a decision and letter of notification. According to value-added assessment, only these steps were value-added from the customers' (the applicants') perspective.

The shaded boxes indicate steps that were required by the university's policies but either did not directly contribute to the output or were redundant steps in the process. Most of the shaded boxes could be eliminated through

Exhibit 57.
Undergraduate Admissions, Office Application Processing

Activity	Average Processing Costs*	Average Working Days to Complete Processing
Processing an application with only a "first review" performed by an admissions officer	$7.21	21
Processing an application with a "second review" performed in consultation with another admissions officer	$12.62	36
Processing an application through a "committee review"	$23.28	40

Source: Process Flow Charting Analysis, GHI University
** Labor and fringe benefit costs only.*

improved systems and/or revised admission policies. The process flowchart helped the redesign team to focus on the truly essential steps that needed to be included in the redesigned process.

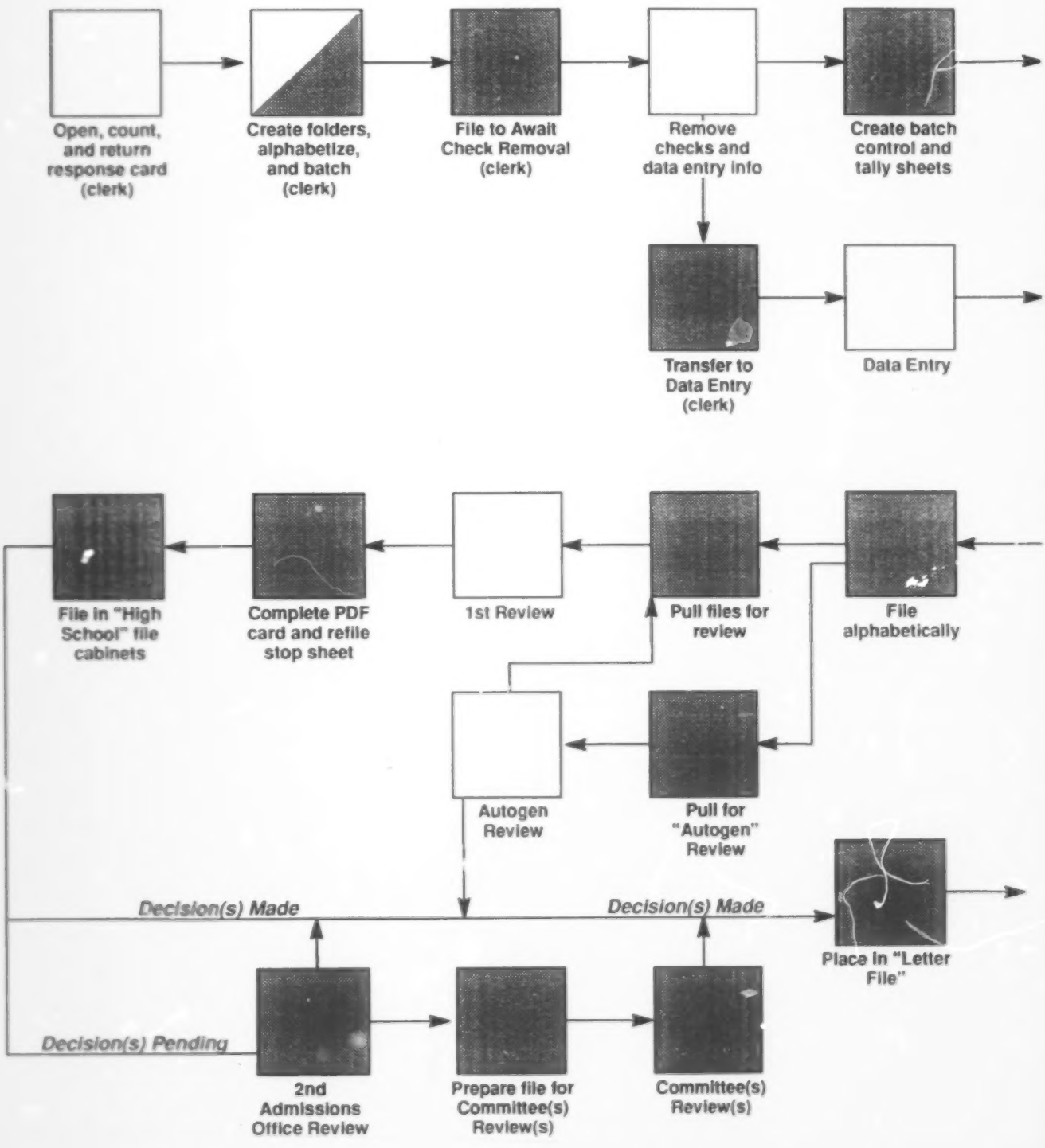
- *Diluted Effectiveness; Distracted Time*: Based on work distribution chart analysis, the pie chart in exhibit 59 shows the breakdown of employee efforts by functional categories. The office devoted only 7 percent of its effort to recruiting—a continual source of frustration to senior admissions managers. Furthermore, roughly 45 percent of staff costs were spent on clerical, paperwork, or administrative activities, of which time 17 percent was spent on working with external departments, largely as a result of the multiple committee review processes. Although the complex committee review process accommodated the special needs of marginal candidates, it was becoming a luxury that this state institution could no longer afford. Through BPR improvements, GHI could increase the slices of the pie devoted to counseling, recruiting, and enrollment management.
- *Marketing and Image Confusion*: In addition to the quantitative dollar impacts, these policies also affected "customers" in more qualitative ways. As acknowledged in an internal report, the varying admission requirements of the undergraduate colleges mystified high school students, parents, and even some high school guidance counselors. The policy to maintain different admission requirements for the undergraduate liberal arts colleges contributed to this confusion, which the university's new president hoped to reduce.
- *Post-Admit Recruiting Confusion and Overlap*: Various colleges "competed" for the students who had been accepted to more than one undergraduate college. As the colleges marketed separately, the recruitment literature was confusing to the students and usually in the best interest of the individual college, rather than the university as a whole.

The long-term, acute lack of systems technology in admissions drastically limited its ability to aggressively recruit top students; efficiently process applications; track and analyze meaningful data; and provide the most basic levels of customer service to students, parents, and external constituencies.

As emphasized throughout chapter II, BPR and information technology go hand in hand. The following systems issues were discovered through process flowcharting and creating the technology baseline. These types of systems had to be resolved as part of the process redesign.

- *Inadequate Prospect Tracking*: Due to funding constraints, the office had an inadequate, cumbersome prospect tracking system—a serious flaw in any aggressive, targeted recruitment plan. The mainframe system was driven by social security numbers, which high school students frequently did not memorize or have on hand when making inquiries or attending college fairs. Furthermore, when planning recruiting visits, officers could not target a group of students in advance to invite them to the session and follow up on their interests.
- *Limited Application Tracking*: Due to funding constraints, the office also had an extremely limited application tracking system, which significantly affected both customer service and employee time and costs. If a student or parent inquired regarding an application's status (receipt, completeness, decision), admission staff could only determine via computer whether the application was received. For additional data, employees had to manually search for and retrieve the individual file. The work distribution chart analysis estimated that $78,000 of staff time was spent each year simply searching for files.
- *Reporting Delays and Database Inaccuracy*: The current system was batch-oriented, rather than online, which delayed reports and decreased the timeliness of database information. Because the system was updated only twice a week, users could not determine if they were using the most recent information.
- *Limitations on Reporting and Research*: The statistical reporting flexibility was very low, limiting report and research capabilities. For instance, the admissions office could not give the dean of a particular college a list of students who had applied only to that college.
- *Manually Generated Routine Correspondence*: Correspondence functions were so limited that letters often had to be custom written. For instance, only a limited, standard set of admission letters could be generated by the computer. Letters had to be manually gener-

Exhibit 58.
Undergraduate Admissions Office Application Processing Flow


Open, count, and return response card (clerk)
Create folders, alphabetize, and batch (clerk)
File to Await Check Removal (clerk)
Remove checks and data entry info
Create batch control and tally sheets
Transfer to Data Entry (clerk)
Data Entry
File in "High School" file cabinets
Complete PDF card and refile stop sheet
1st Review
Pull files for review
File alphabetically
Autogen Review
Pull for "Autogen" Review
Decision(s) Made
Decision(s) Made
Place in "Letter File"
Decision(s) Pending
2nd Admissions Office Review
Prepare file for Committee(s) Review(s)
Committee(s) Review(s)

Source: Process Flow Charting Analysis

Exhibit 58 (Continued).
Undergraduate Admissions Office Application Processing Flow

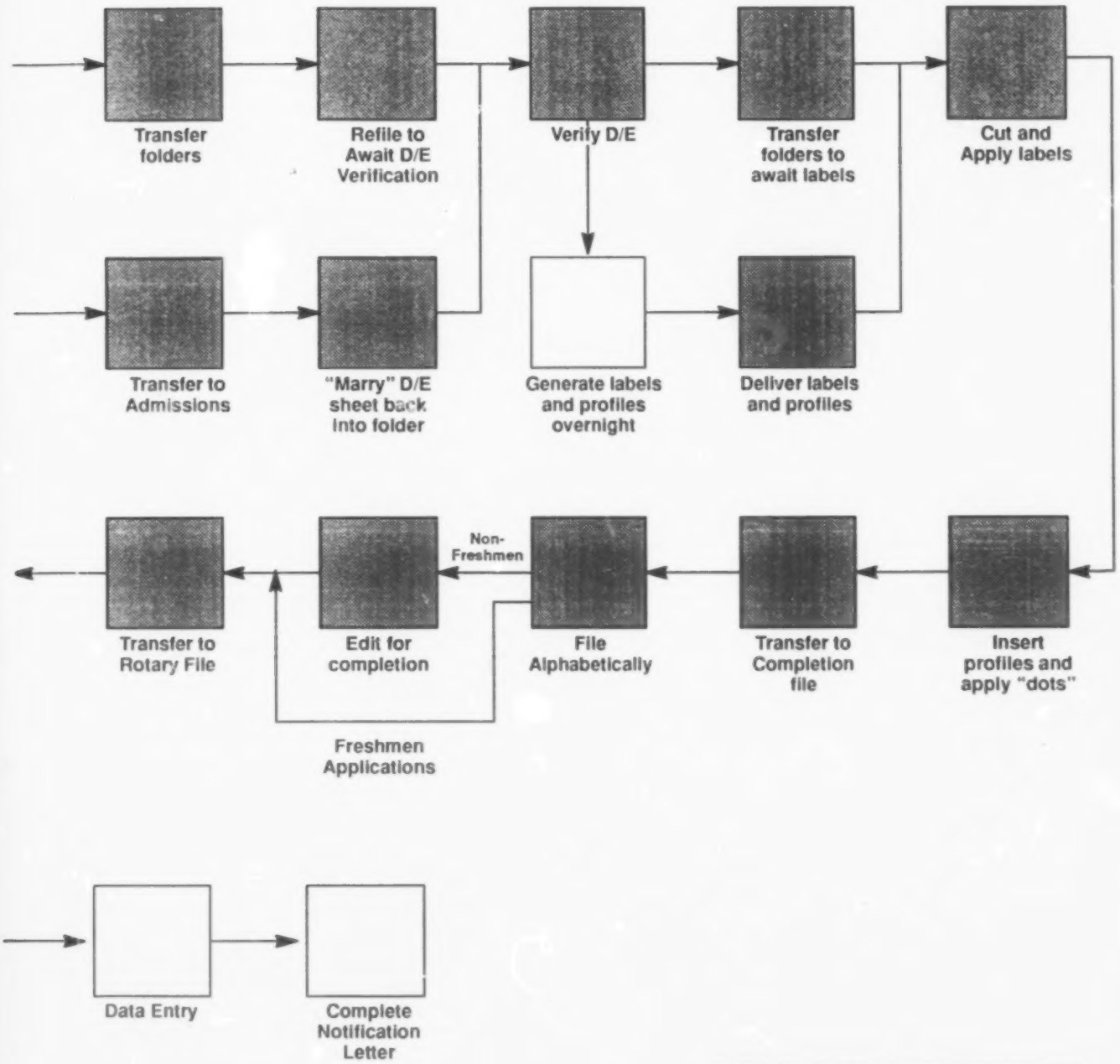
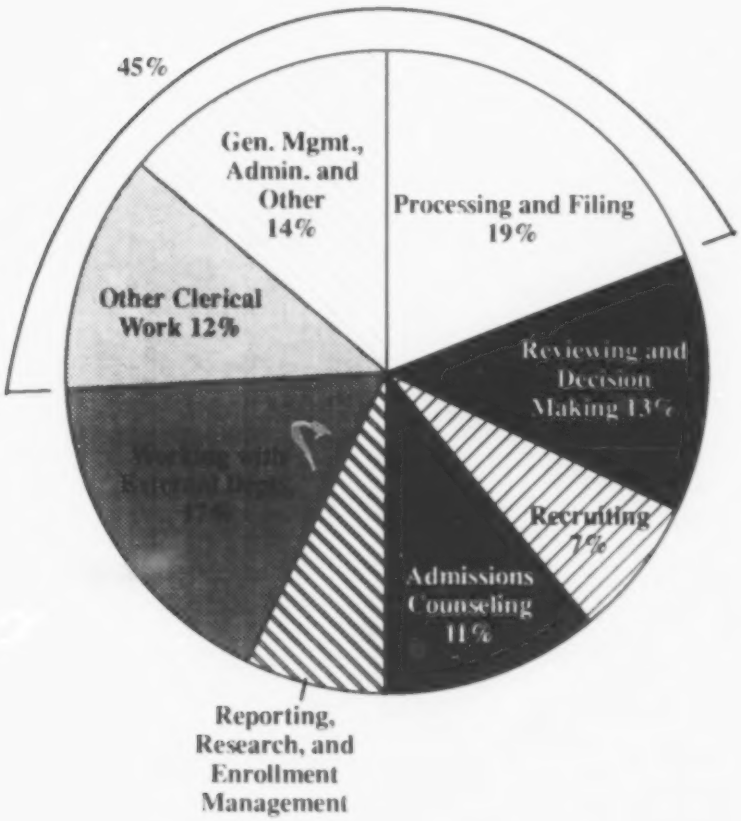


Exhibit 59.
Undergraduate Admissions Office, Work Distribution Analysis*



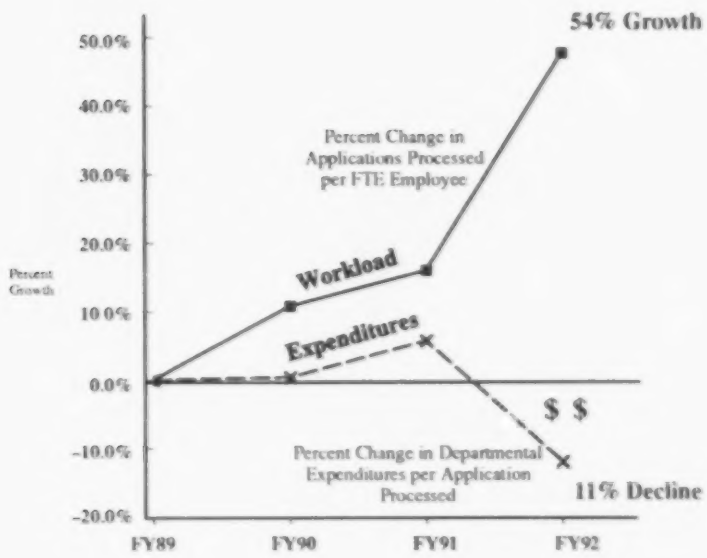
* *Percentages based on labor and fringe benefits costs.*
Source: Work Distribution Analysis

ated for any student who did not fall into one of five or six types. Furthermore, the standardized, computerized letters could not be personalized with a simple, additional line of explanation or information.

Employee workloads measurably increased over a period of several years, affecting responsiveness and service and indicating that "business as usual" was no longer sustainable.

Volume analysis indicated that the total number of admissions FTE employees decreased from a 1989 high of 103 employees to a 1992 low of 87 employees—a decrease of 16 percent. Over the same time period, the number of applications to GHI University increased by 29 percent. Thus, as shown in exhibit 60, admissions processed 54 percent more applications per employee in 1992 than it did four years earlier. Furthermore, the total departmental expenditures per application de-

Exhibit 60.
Changes in Admissions Office Workload and Expenditures



Base year for comparison is fiscal year 1989.
Source: Volume Analysis

creased by 12.8 percent over the same time period. This trend was clearly not sustainable in the long term, emphasizing the need to streamline and simplify processing to accommodate admissions' increasing workload.

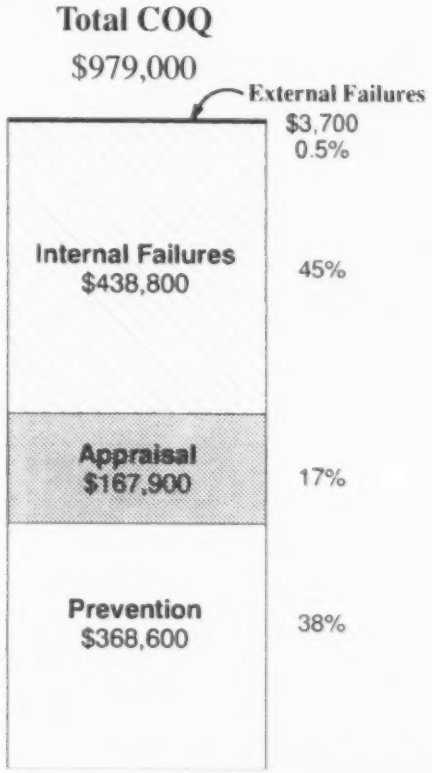
The inconsistent policies, procedural complexities, and insufficient technology within admissions led to a COQ of $989,900 or 29 percent of the total operating budget. Of this, approximately $270,000 could be eliminated through rapid process improvement.

Exhibit 61 depicts the COQ composition within GHI's admissions office. The office faced a COQ of nearly one third its expenditures—a daunting figure, but better than many organizations, in which COQ often reaches 40 percent. The positive aspects of this COQ were that the percentage of prevention expenditures was comparatively high, and external failures were virtually nil, as less than 0.5 percent of staff effort was devoted to investigating and responding to appeals. The areas of opportunity were in internal failures and appraisal costs.

- *Internal Failures:* As shown in exhibit 61, these costs were due primarily to the data-entry corrections, searches for files, and multiple or redundant reviews of applications. Improved systems and procedures would address some of these issues, policy changes would address others. Additionally, improved training (prevention costs) of admissions officers might help individual officers make a greater percentage of admission decisions earlier in the process without additional consultation.
- *Appraisal Costs:* The majority of these review costs could be attributed to systems issues. With improved systems, GHI would significantly reduce completion audits, search requests, and data problems.

Exhibit 61.
Undergraduate Admissions Office — Cost of Quality

- **Internal failure cost examples:**
  - Data entry edits and rework — $96,300
  - Redundant Xeroxing — $20,800
  - Searching for files — $78,100
  - Redundant reviews (2nd or more school or campus) — $98,100
  - Redundant reviews (no decision at 1st review) — $145,500
- **Appraisal cost examples:**
  - Performing application completion audit — $53,800
  - Auditing student folders for deans — $62,900
  - Searching data input — $41,200
  - Testing systems — $6,000



Source: Cost of Quality Analysis

The data from the COQ analysis focused the team on groups of issues that could be resolved through a common solution. Policies and systems were major factors in the COQ and consequently were carefully considered in the redesign.

Recommendations and Results

The recommendations derived from the BPR analyses are summarized in exhibit 62. Improvements in each of these areas helped the admissions office reallocate resources to areas where they were desperately needed. Many of these changes had to be led by the most senior university officials, as the changes directly affected the dean's offices of the undergraduate colleges. By addressing the policy issues and implementing improved systems, the admission process resembled exhibit 63. The most time-consuming and expensive activities of the current process flow were the multiple committee reviews. The redesigned process relies on increased training and empowerment of the admissions officers enabling them to make admit/reject decisions on a first review. The COQ analysis projects an annual savings of approximately $270,000 with these improvements.

Additionally, many other qualitative improvements will be realized, especially in the area of customer service and the effectiveness of the existing staff. Recruitment visits will be targeted more effectively with timely "follow ups" and applicant tracking. Applicants will have access to direct, up-to-date, and accurate information on the status of their applications. Overall, admissions staff will spend less time arranging for and negotiating with politically driven committees, and will focus more on value-added activities to support university recruitment, outreach, counseling and enrollment management.

BPR Summary

This analysis and redesign heavily focused on the policy and political structure of the university—a hazardous topic in most any institution. BPR is effective in this environment, as it gives change agents the objective and overwhelming evidence to initiate change. As institutions move through the 1990s, it is precisely those "sacred cows" formerly taken for granted that must be challenged in order to concentrate scarce resources on truly value-added activities. In this case study, the admissions staff fully recognized the need for cross-functional change but was powerless to begin it from their isolated functional area. The most difficult part of this redesign process was obviously negotiating change with the college deans—an effort that must be facilitated by the most senior university officials, and even the board of trustees.

Creating a Master Course Schedule

Background

JKL is a small, liberal arts college with a part-time degree program for adults. The adult program runs on nights and weekends with approximately 600 students enrolled each semester. The students in this program typically worked full-time, and many were sponsored by their companies. The enrollment in the evening and weekend degree program had been growing rapidly over the last few years (approximately 45 percent since 1990).

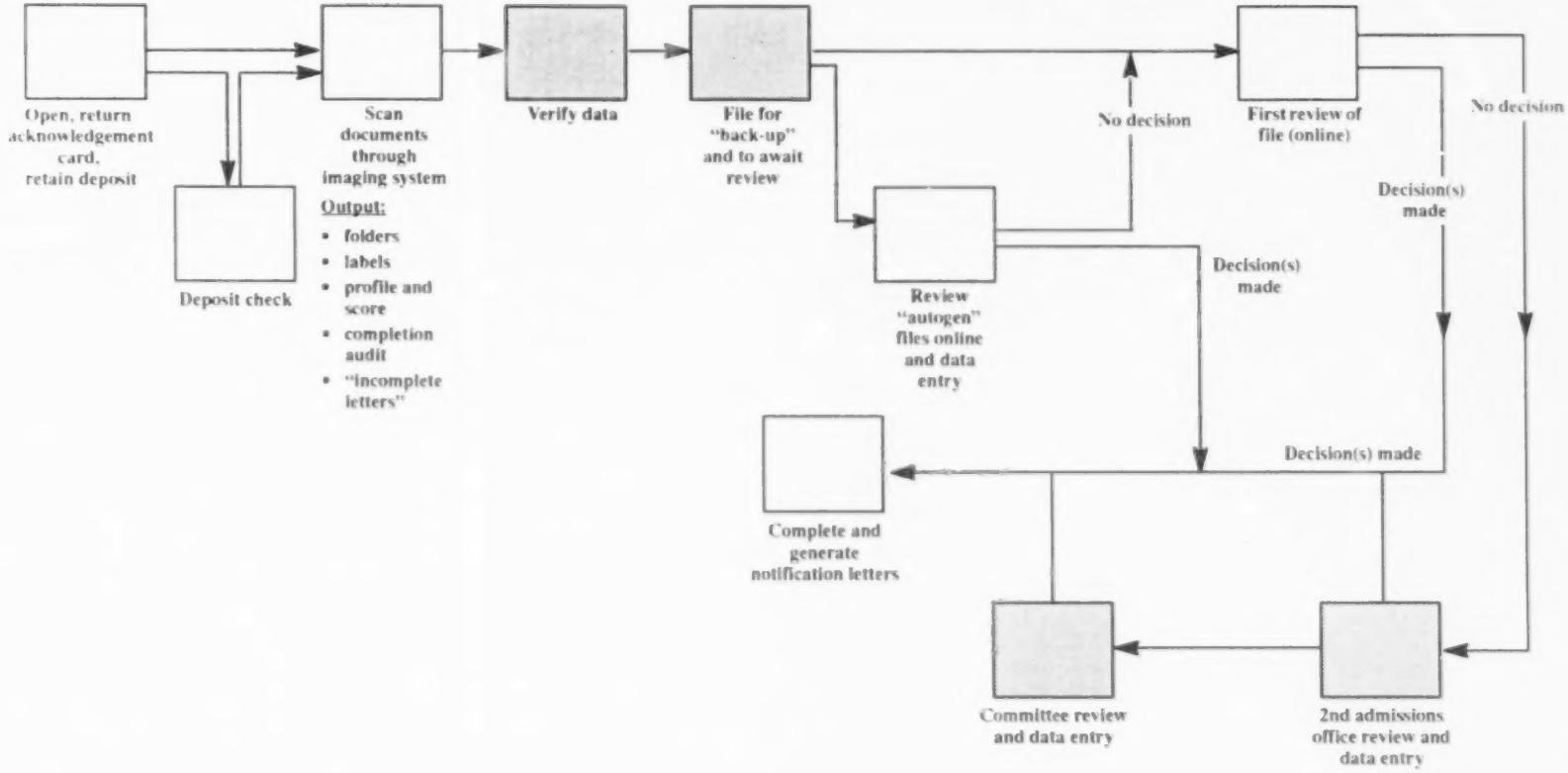
With the rapid growth in the program, students demanded not only more courses but a greater variety in course offerings. To meet these demands, developing a master schedule of all course offerings became more difficult due to an unclear and manually intensive process. As a result, department chairs and adult program staff were frustrated with the significant amount of time involved in developing and revising the course schedule. JKL administrators realized that a once simple process to schedule a few courses had grown into an unmanageable and dysfunctional process that could not support the provision of a wide variety of courses for a growing student body. In response to these frustrations, JKL created a team to evaluate the night and weekend college course-scheduling process, using BPR tools and techniques. This BPR effort addressed the process of developing a master schedule of all courses and sections, rather than the process of one student attempting to register for a convenient schedule of classes. The process cut across many departments, and therefore the team consisted of the adult program director, adult program counselors, department chairs, the registrar, and the assistant dean. The purpose of the team was to find the answers to two questions:

- Was JKL "doing the right things"—did the portfolio of courses offered meet students' needs?

Exhibit 62.
Admitting Undergraduate Students — Recommendations and Results Table

Issue	Recommendation	Expected Benefits
Unique admissions requirements for main campus's liberal arts undergraduate colleges increase costs and confusion	■ GHI should aggressively pursue standardization of admissions requirements for some or all of the colleges.	■ Reduced cost and efforts in application processing ■ Projection of a consistent image to potential applicants ■ Reduced confusion, competition, and overlap in recruiting
Inadequate technology to support recruiting and application processing increases rework, time, cost, confusion, and customer frustration	■ Either install a new Admissions Office prospect tracking system or secure programming resources to link the PC-based system with the mainframe. Improvements will depend on funding and should be part of GHI's computing priorities. ■ Evaluate the feasibility of using application bar-coding to feed Admissions' tracking system with ongoing application status information. ■ Assess Admissions' mainframe computing requirements, developing priorities for improvements and integrating them with the university's computing plans. ■ Further investigate the long-term implications of image processing, quantifying the potential costs or savings.	■ Increased ability to target prospective applicants, track inquiry history, and coordinate recruitment effort ■ Potential to increase enrollments of out-of-state students and special interest groups such as high achievers, under-represented minorities, etc. ■ Increased ease in application tracking ■ Improved information and service for prospective and current applicants ■ Reduced costs and potential for significant improvement in operations through automation ■ Increased ability to share information quickly among campuses ■ Increased ability to research and analyze enrollment issues
Opportunities for savings in the Costs of Quality	■ Train Admissions Officers so that more admissions decisions can be made upon the first review. ■ As part of the policy issues above, reconsider the committee review system, working to identify those committees which are truly essential to the university's mission. ■ Evaluate the cost/benefits of using a lock box operation to process application checks.	■ Reduced time and costs to process applications ■ Reduced overall workload for Admissions Officers ■ Reduced time and costs to process check deposits and reconciliations ■ Opportunity to significantly improve operations, increase savings, and improve customer service

Exhibit 63.
Proposed Undergraduate Admissions Applications Processing



☐ = Non-Value-Added or Redundant Steps

Source: Process Flow Charting Analysis and Value Added Analysis

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- Was JKL "doing things right"—was the process of selecting courses and developing the course schedule efficient?

The team analyzed the course scheduling process for the adult degree program over a three-month period. At the end of three months, it presented management with recommendations to redesign both the process and the portfolio of courses offered.

BPR Tools and Techniques Applied

JKL used customer analysis, process flowcharts, and NVA assessment to assess the college's course scheduling process for the adult degree program. The purpose of each tool is listed below:

- Customer Analysis
  - Identified customer and employee expectations of the process through face-to-face interviews
  - Quantified customers' ratings of both the relative importance of their various expectations and the current satisfaction with the process with respect to these expectations
  - Focused the improvement efforts on customer expectations that were high in importance and low in performance
  - Conducted a formal student survey to assess students' satisfaction with the portfolio of courses and the specific aspects of the course schedule process
- Process Flowcharts with Value-Added/Non-Value-Added Assessment
  - Created a diagram of the steps to create a master course schedule
  - Identified bottlenecks in the process
  - Identified value-added and non-value-added steps
- Volume Analysis
  - Analyzed the number of course offerings in six categories for eight semesters:
    - number of departments offering courses
    - level of courses
    - days and times offered
    - number of sections offered
    - course format offered
    - type of course offered (liberal arts, major, concentration, etc.)

Findings and Conclusions

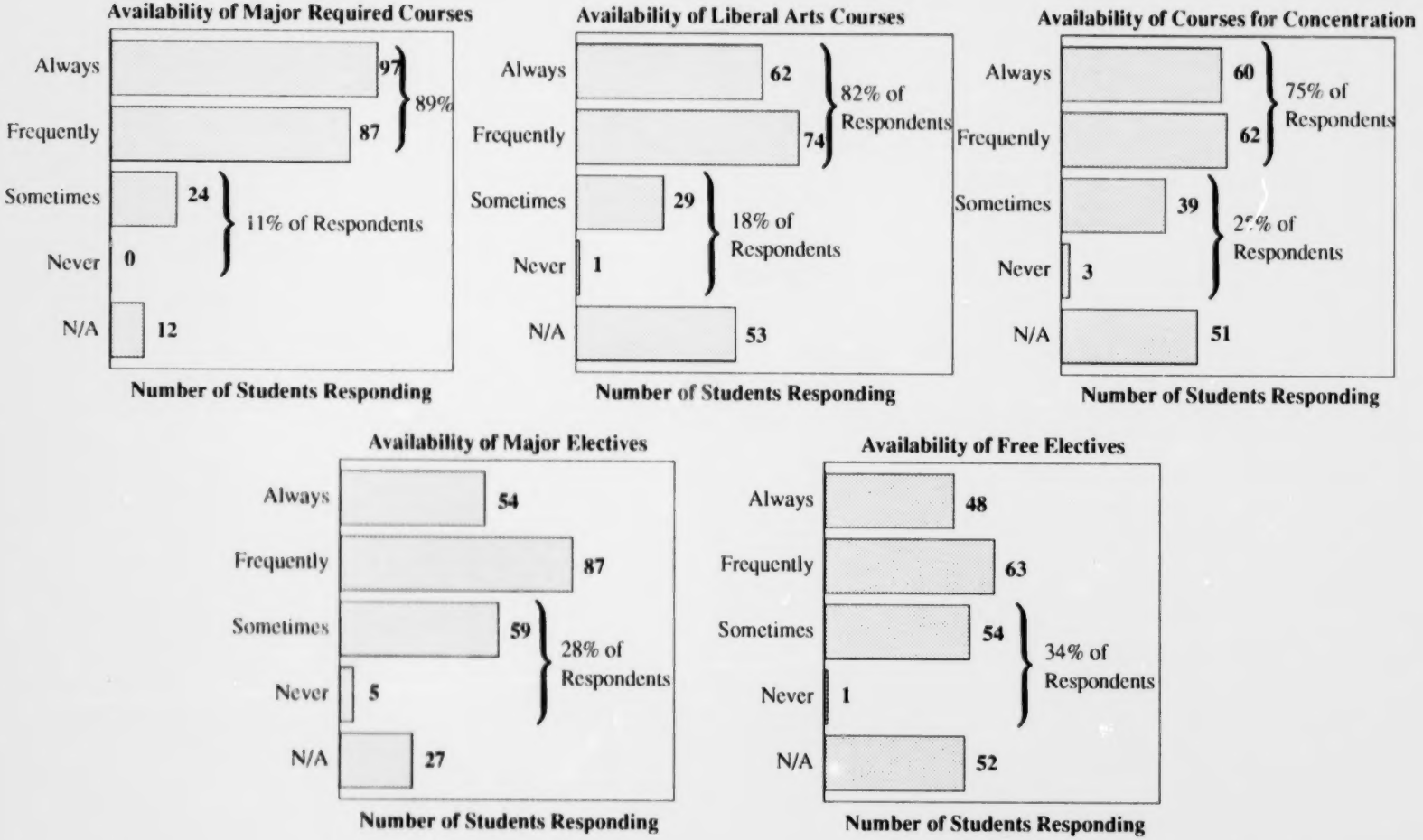
The conclusions drawn from the application of BPR tools focused on two areas: offering the right portfolio of courses, and efficiently developing the course schedule. The conclusions are outlined below.

Students indicated in both the informal interviews and the formal survey a need for greater variety in the portfolio of courses offered in terms of format, timing, workload, and free electives.

Using customer analysis, the team conducted face-to-face interviews, focus groups, and a formal survey to understand students' needs and current satisfaction with the portfolio of courses and with the way the course schedule information was communicated to students. Using the volume analysis tool described in the chapter on BPR tools, the results of the interviews and survey were compared to the variety of courses JKL actually offered.

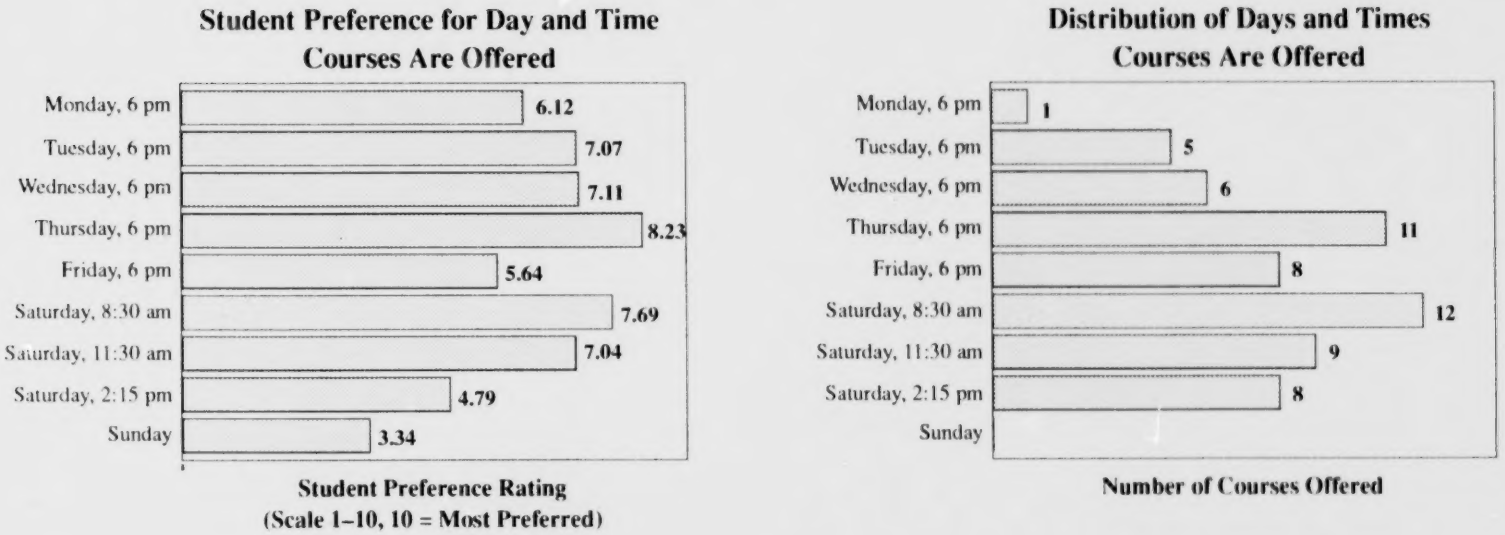
- Overall, students were satisfied with the availability of required major, liberal arts, and concentration courses; however, many students were not always able to take the major and free electives that they wanted. The top three graphs of exhibit 64 show that most students believed that required major and liberal arts courses were available upon demand. For these courses, 89, 82, and 75 percent of students, respectively, felt that the courses were always or frequently available. On the other hand, 28 percent and 34 percent of respondents felt that they were "sometimes" or "never" able to take the major and free electives, respectively, that they wanted. Students also commented in focus groups that the adult program should have offered more free electives. For example, students indicated the most popular free electives were in the home economics and communications departments, yet there were only one or two courses offered per semester in these disciplines.
- Student preferences for course times and days differed from actual course offerings. As illustrated in the left graph of exhibit 65, students preferred to take courses on Thursday evening, Saturday morning, Wednesday evening, and Tuesday evening (in that order). Students had a low preference for Friday night, Saturday afternoon, and Sundays. The right graph of

Exhibit 64.
Survey Results: Student Satisfaction with Course Offerings at JKL College



Source: Customer Analysis

Exhibit 65.
Survey Results — Days and Times of Courses at JKL College



Note: The courses offered on Tuesdays and Wednesdays are not in the adult program format.
Source: Customer Analysis, JKL College.

exhibit 65 shows that although JKL did offer the most courses on Saturday morning and Thursday evening, JKL offered too many courses on Friday night and Saturday afternoon and too few on Tuesday and Wednesday nights. Thus, JKL needed to redistribute the days and times courses were offered to meet the students' needs more effectively.

- The workload of the course and the course instructor emerged as the two most important factors in the students' decision to take a course. However, students did not feel that the heavy and light workload courses were balanced each term. Additionally, students were not told their instructors names until classes started.

The customer survey results in exhibit 66 could be logically grouped into four categories, based on the grouping of rating scores, from most important (1) to less important (4):

(1) Perceived Workload of the Course
(2) Instructor, Day/Time Course Offered, Level of Difficulty (Introductory, Second Tier, Upper Division)
(3) Adult Program Format
(4) Adults Only in Class

Exhibit 66 illustrates that "perceived workload" was the most important factor in a student's decision to take a course. Most students in the adult program worked full-time and wanted the option of taking light workload courses to help them manage their jobs, families, and academic workloads. To better meet student needs, JKL needed to evaluate whether student perceptions of course workloads were legitimate and then possibly incorporate this factor when structuring course offerings in the future. Although the second most important factor was the instructor teaching the course, JKL did not identify instructors on the course schedule, and students did not know who was teaching the course until class started. In the face-to-face interviews and focus groups, students expressed great frustration that schedules did not include faculty names; in many cases, students dropped courses or attempted to switch sections if they did not like the instructor, thus ultimately increasing the administrative workload for the registrar.

Looking at categories (1) and (2), the team noted that several factors really addressed the same issue: how hard and/or time-consuming the students felt the courses would be. This provided strong evidence that course difficulty was a real factor for student decision making. The perception, however, that different instructors in multiple-section courses demanded different levels of student involvement or work was also recognized as a problem. This issue was not addressed by the BPR team, but instead was taken up by JKL's deans.

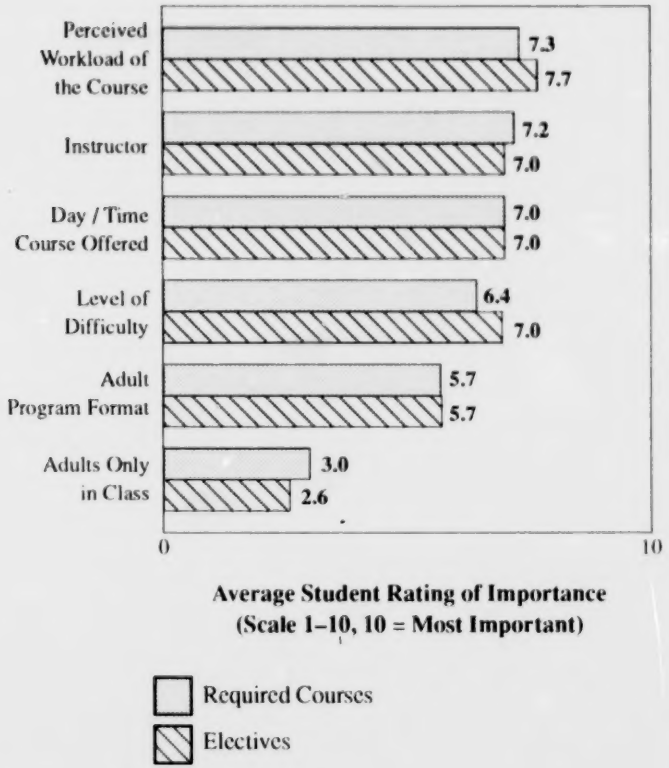
Inconsistent, complicated processes for scheduling adult program courses led to confusion in responsibilities, duplication of effort, and wasted time resolving conflicts and processing revisions.

- Two similar scheduling processes occurred simultaneously without communication and were reconciled late in the process, resulting in significant rework and delays. Exhibit 67 displays the original adult program course-scheduling process. The process was very complicated, with a significant number of steps and interruptions in the flow of work. The flowchart shows two branching paths early in the process. Branch A had far fewer steps, hand offs, and departments involved in the process. The flowchart drove the team during visioning to create one standard process and to eliminate as many steps as possible from the more complicated branch B.

NVA assessment showed that 68 percent of the steps were non-value-added, as indicated by the shaded boxes in the exhibit. Value-added steps included selecting courses; assigning day, times, and faculty; and preparing the consolidated schedule. Most non-value-added steps were related to processing multiple revisions to the course schedule.

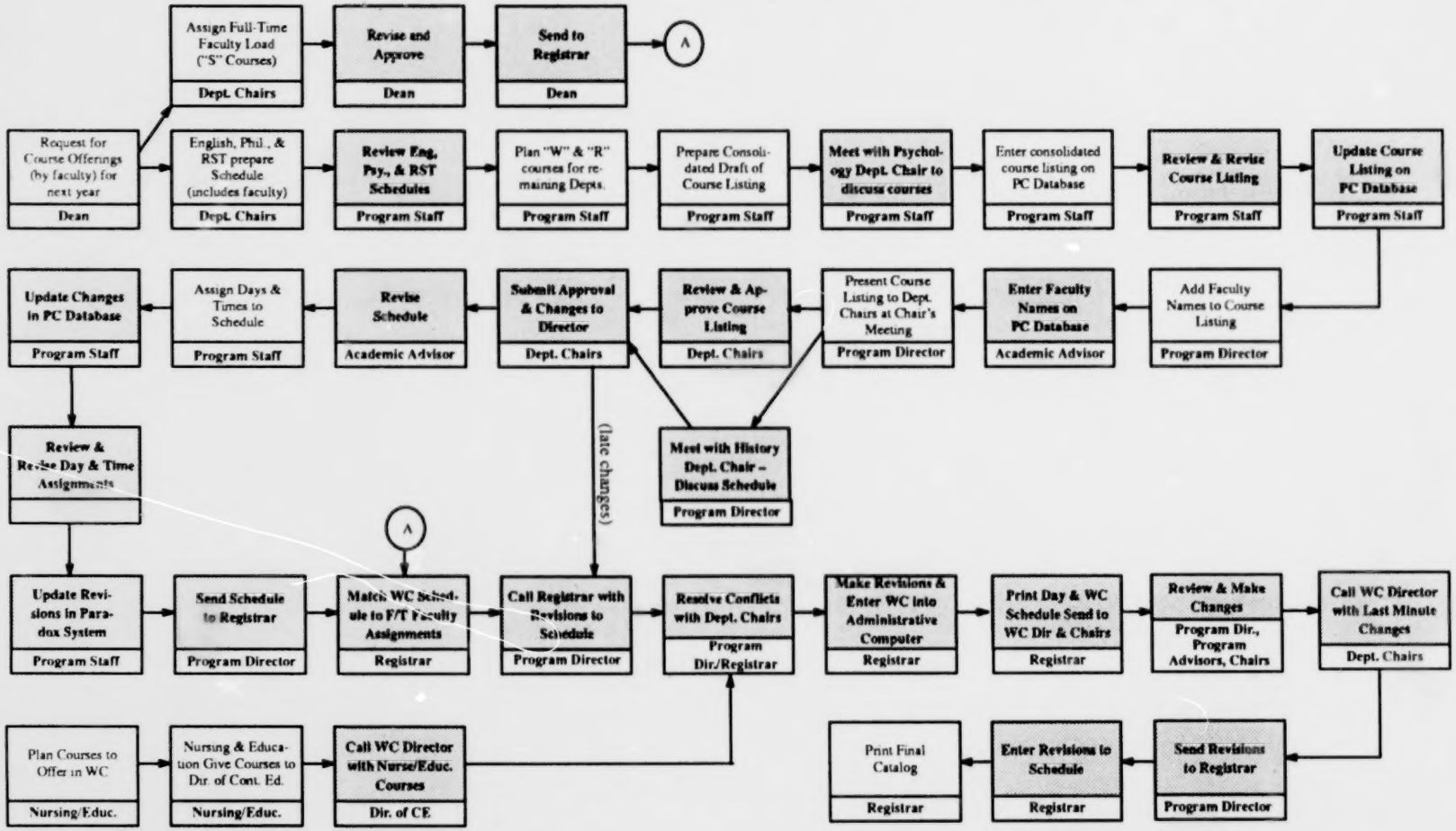
One major factor contributing to the revisions was that no clear scheduling policy indicated who was ultimately responsible and accountable for the adult program course scheduling; it could be the department chairs or the adult program director. As a result, only a few department chairs took responsibility for scheduling the adult degree program courses and for identifying faculty resources. The remaining department chairs not only expected the program director to schedule the courses for them, they further complicated the process by failing to notify the director of prior faculty

Exhibit 66.
Survey Results — Factors Influencing Students' Decisions to Take a Particular Course at JKL College



Source: Customer Analysis

Exhibit 67.
Course Scheduling Process Adult Degree Program, JKL College


Request for Course Offerings (by faculty) for next year
Dean
Assign Full-Time Faculty Load ("S" Courses)
Dept. Chairs
English, Phil., & RST prepare Schedule (includes faculty)
Dept. Chairs
Revise and Approve
Dean
Review Eng, Psy., & RST Schedules
Program Staff
Send to Registrar
Dean
Plan "W" & "R" courses for remaining Depts.
Program Staff
Prepare Consolidated Draft of Course Listing
Program Staff
Meet with Psychology Dept. Chair to discuss courses
Program Staff
Enter consolidated course listing on PC Database
Program Staff
Review & Revise Course Listing
Program Staff
Update Course Listing on PC Database
Program Staff
Add Faculty Names to Course Listing
Program Director
Enter Faculty Names on PC Database
Academic Advisor
Present Course Listing to Dept. Chairs at Chair's Meeting
Program Director
Review & Approve Course Listing
Dept. Chairs
Submit Approval & Changes to Director
Dept. Chairs
Revise Schedule
Academic Advisor
Assign Days & Times to Schedule
Program Staff
Update Changes in PC Database
Program Staff
Review & Revise Day & Time Assignments
Meet with History Dept. Chair – Discuss Schedule
Program Director
(late changes)
Update Revisions in Paradox System
Program Staff
Send Schedule to Registrar
Program Director
Match WC Schedule to F/T Faculty Assignments
Registrar
Call Registrar with Revisions to Schedule
Program Director
Resolve Conflicts with Dept. Chairs
Program Dir./Registrar
Make Revisions & Enter WC into Administrative Computer
Registrar
Print Day & WC Schedule Send to WC Dir & Chairs
Registrar
Review & Make Changes
Program Dir., Program Advisors, Chairs
Call WC Director with Last Minute Changes
Dept. Chairs
Send Revisions to Registrar
Program Director
Enter Revisions to Schedule
Registrar
Print Final Catalog
Registrar
Plan Courses to Offer in WC
Nursing/Educ.
Nursing & Education Give Courses to Dir. of Cont. Ed.
Nursing/Educ.
Call WC Director with Nurse/Educ. Courses
Dir. of CE
Non–Value-Added Step or Unnecessary with Improved Systems / Procedures

Sources: Process Flow Charting Analysis and Non-Value-Added Analysis

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commitments to day-time college courses. The day college and evening adult program schedules were not reconciled until the registrar integrated the two schedules late in the process. When conflicts were discovered, the registrar and adult program director expended considerable effort researching the discrepancies and revising the schedules accordingly.

To assess the level of rework in the process, the team measured the number of revisions at various points in the process, such as additions, faculty changes, cancellations, and day or time changes.

- 27 percent of the courses were changed when the day college and evening schedules were integrated
- 27 percent of the courses were changed prior to the printing of the schedule
- 30 percent of the courses actually offered were changed after the initial printing of the catalog (time change, instructor change, section change, and course additions and deletions).

These rework levels were directly responsible for unnecessary costs and unnecessary delays in producing the schedule. By understanding the problems with the current process, the BPR team developed many good redesign ideas during the visioning that were later implemented.

- Lack of communication also contributed to redundancy and rework late in the course-scheduling process. As mentioned earlier, most department chairs left course scheduling to the adult program director. The adult program director scheduled courses for those departments, distributed a draft of the entire adult program course schedule to all department chairs, and then requested revisions by a certain date. Most department chairs failed to submit timely revisions and, in fact, followed the "accepted practice" of submitting changes very late in the process, even after the schedule was printed. As a result of this tardy communication, the program director and registrar had to constantly change the schedule. Even after the schedule was printed, students received several course schedule updates.

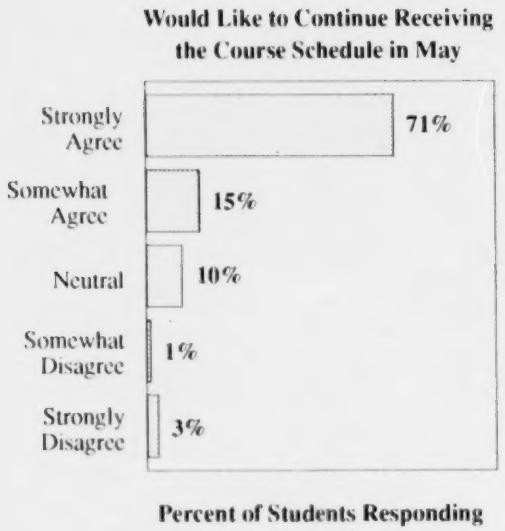
Customer analysis confirmed the obvious—that students placed great value on receiving a timely and accurate schedule to help them accommodate their demanding work schedules. Although students received the initial catalog in May for the upcoming academic year, multiple updates were received throughout June, July, and even August. As illustrated in exhibit 68, most students wanted to receive the schedule at least six months in advance, which was incorporated into the redesign.

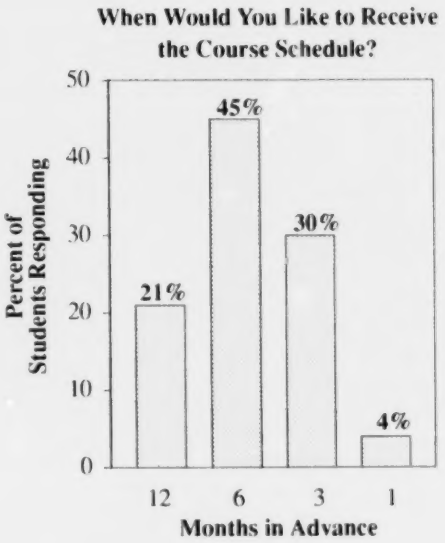
- Lack of access to the registrar's system resulted in duplicate effort and a paper-intensive process. The adult program staff and department chairs did not have access to the master schedule on the administrative computing system. As a result, the adult program staff developed a "shadow system" (their own separate PC database) to produce the initial course schedule. Each department's revisions were keyed into the database; the schedule was then sent to the registrar, who reentered the schedule in the administrative computing system. Again, the department chairs reviewed drafts of the schedule, submitted further revisions, and then repeated the cycle, becoming an extremely cumbersome process given the volume and timing of revisions. JKL College could save time and costs in preparing the course schedule if department chairs and adult program staff had read-only access to the master schedule in the administrative computer.

Recommendations and Results

Exhibit 69 summarizes the recommendations and expected results of BPR. The proposed process, shown in exhibit 70, eliminated 38 percent of the steps in the current process. The major change in the process shifted authority and responsibility for scheduling adult program courses to the department chairs who, as in the day college, had ultimate responsibility for maintaining academic integrity of the degree program. The key was linking outside authority, responsibility, and accountability to a single party: the department chairs. To facilitate the scheduling process, the adult program staff provided the chairs with historical data, such as scheduling patterns and student needs. The duplication of effort and multiple rounds of revisions were eliminated in the new process, reducing the time and effort involved in developing a course schedule.

Exhibit 68.
Survey Results — Student Satisfaction with Course Schedule at JKL College



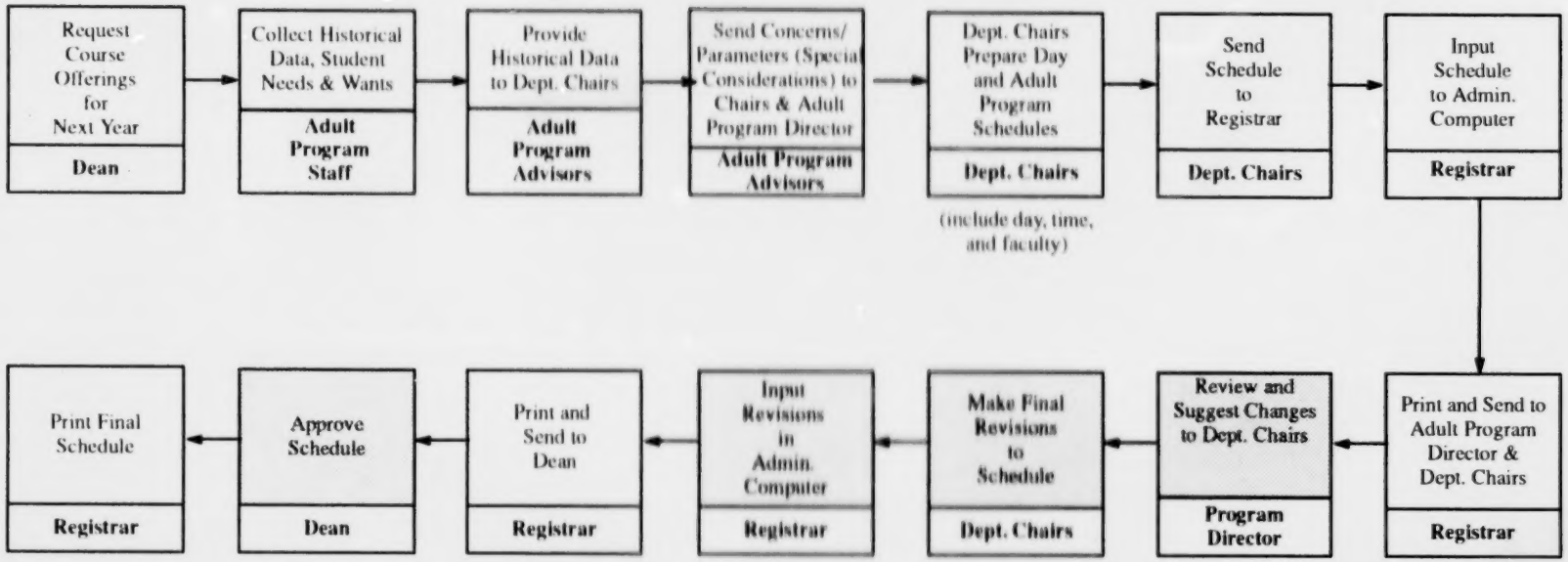


Source: Customer Analysis

Exhibit 69.
Creating a Master Course Schedule — Recommendations and Results Table

Issue	Recommendation	Expected Benefits
Students want greater variety in the portfolio of courses offered in terms of format, days/times, workload, and free electives.	■ Offer adult program format courses on Tuesday and Wednesday evenings. ■ Offer more courses on Saturday morning and Thursday evening and fewer courses on Friday night and Saturday afternoon. (Note that the college is not constrained by the physical capacity of the campus from supporting the redistributed classes.) ■ Offer the majority of the Psychology courses during the week ■ Balance each semester with light and heavy workload classes ■ Structure all sections of the same course to be taught with equal workloads by training full-time and adjunct faculty ■ Offer a greater variety of free electives	■ Increase customer service ■ Increase enrollment ■ Increase in the average number of courses per student per term, translating to increased tuition revenues
Complex process with significant rework, duplication and delays.	■ Redesign process for scheduling adult program as illustrated in Exhibit 70. The redesign requires JKL to establish a policy which shifts all course scheduling authority and responsibility to department chairs, including selection of courses, days, times, and faculty. ■ Provide department chairs and adult program staff access to the master schedule in the administrative computing system (the department chairs would input course schedules directly in the system). ■ With the redesigned process, issue the course schedule 5–6 months in advance of the opening of the academic year.	■ Produce a more accurate and timely course schedule for students ■ Reduce costs ■ Eliminate shadow scheduling system ■ Provide better integration of day college and adult program scheduling ■ Increase service by providing department chairs with on-line access to scheduling information

Exhibit 70.
Proposed Scheduling Process, JKL College



Non-value-added step or unnecessary with improved technology

Sources: Process Flow Charting Analysis and Non-Value-Added Analysis, JKL College.

Not only was the new process more efficient and cost-effective for the institution, it improved the quality of customer service. Students were offered a greater variety of courses and a more accurate and timely schedule. In addition, the adult program staff was less frustrated with the time involved in developing the schedule each year and was able to spend more time on value-added services such as recruitment, new program development, counseling, and promoting the adult program.

BPR Summary

The team used a limited number of BPR tools in a short period of time to assess the current course-scheduling process. The team focused primarily on customer analysis to assess whether JKL was "doing things right." The assessment gave JKL a clear understanding of what students needed and wanted as well as an initial model for redesigning the course scheduling process. In addition, the team decided to implement the customer survey on a regular basis to measure JKL's performance on an ongoing basis.

As in other cases, the critical success factor for implementing the redesign process was the support of senior management. Although several department chairs already scheduled their own courses for the adult program, shifting the scheduling responsibility to the remaining department chairs was the most difficult part for senior management. Senior management also established clear policies and rationale supporting the redesign and then led the implementation effort.

Updating Employee Personnel Records

Background

MNO University is a large, public, research university in the western United States with approximately 2,000 employees and 7,000 students. This BPR case study was unique in that five universitywide processes were analyzed over a very short time period (five weeks) in order to prioritize future redesign efforts. This case study presents a subprocess of one of the five processes that were analyzed. The university realized that many of its core processes needed redesign but also recognized that it could only "do so much at one time." The goal of the BPR analysis was to quickly quantify cost savings, understand customer frustrations and priorities, project savings, and select the two or three processes that should be redesigned first.

BPR Tools and Techniques Applied

MNO used process flowcharts, NVA assessment, work distribution analysis, and customer analysis to assess this universitywide process to change an employee's personnel record. The purpose of each tool is listed below:

- Creating Process Flowcharts with Value-Added/Non-Value-Added Assessment:
  - Quantified the high-level cost to update an employee's record
  - Identified cost drivers and process complexities
  - Identified bottlenecks
  - Identified and quantified the effects of non-value-added activities
- Creating a Work Distribution Chart:
  - At a very high level, across the entire university, quantified FTE staff time and total number of employees associated with the process
- Customer Analysis:
  - Discovered areas of customer concern or dissatisfaction
  - Quantified priority of services and satisfaction with current performance

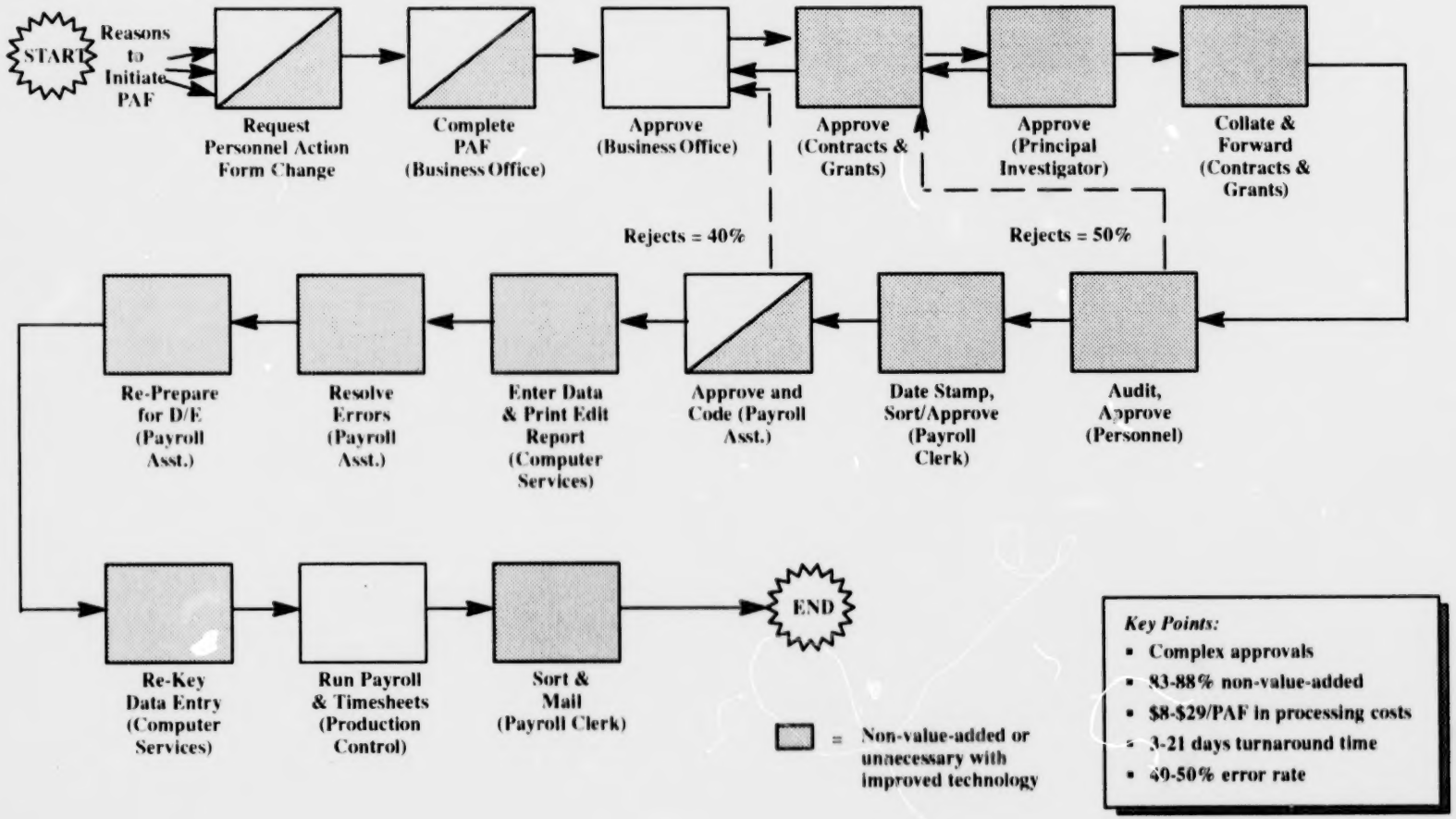
Findings and Conclusions

The major conclusions derived from this analysis focused on three issues: process complexity, ineffective systems, and unclear, inconsistent policies. Each of these three conclusions is presented, followed by the supporting detail derived from each of the analytical tools.

The original process was laden with unnecessary approvals, redundancy, and errors, which significantly increased processing time and led to unnecessary costs.

- *Complex, Time-Consuming Process:* Created by using the process flowchart tool, the diagram in exhibit 71 presents the original process for an employee to change his or her personnel record using a personnel action form (PAF). In this example, the employee changed his salary distribution from one research grant to another. Each PAF required four to eight approv-

Exhibit 71.
Process to Change an Employee Record at MNO University


START
Reasons to Initiate PAF
Request Personnel Action Form Change
Complete PAF (Business Office)
Approve (Business Office)
Approve (Contracts & Grants)
Approve (Principal Investigator)
Collate & Forward (Contracts & Grants)
Rejects = 40%
Rejects = 50%
Re-Prepare for D/E (Payroll Asst.)
Resolve Errors (Payroll Asst.)
Enter Data & Print Edit Report (Computer Services)
Approve and Code (Payroll Asst.)
Date Stamp, Sort/Approve (Payroll Clerk)
Audit, Approve (Personnel)
Re-Key Data Entry (Computer Services)
Run Payroll & Timesheets (Production Control)
Sort & Mail (Payroll Clerk)
END
= Non-value-added or unnecessary with improved technology
Key Points:
Complex approvals
83-88% non-value-added
$8-$29/PAF in processing costs
3-21 days turnaround time
40-50% error rate

Source: Process Flow Charting Analysis

als, crossed eight to ten desks, and was tracked in up to seven manual or electronic storage systems. Process flowchart calculations showed that it took up to 21 working days for the transaction to be entered into the university's computer system. This was an extraordinary amount of time and effort for a simple transaction initiated by hundreds of faculty members every semester. The BPR team found that all of these approvals were not truly necessary. The approvals ensured that all parties were *aware* of the transaction rather than *approved* of the transaction. Because the process took so long and the systems were weak, all parties wanted to ensure that they had the most recent, accurate information by seeing the original paper PAF.

In addition to being complex and slow, the process consumed significant employee time. The campuswide, high-level work distribution survey showed that 172 employees in some way spent time processing these transactions, equating to 18 FTEs. Notably, the salary distribution example was only one reason to change an employee record. Other changes (address or name change, for instance) underwent the same complex and time-consuming process. Most of these changes could be automatically entered and approved (once only) on a computer system, reducing the need for 172 sets of fingers to touch these paper-ridden transactions.

- *Errors and Approvals Increased Costs:* Value-added assessment showed that more than 80 percent of the processing time was non-value-added, burdening the process with unnecessary costs. Each transaction cost up to $29 to process, with roughly 13,000 transactions each year. Furthermore, error rates were extremely high, with almost 50 percent of the transactions being reworked or rejected outright by the personnel office. Despite this rework in the personnel office, 40 percent of the transactions were still rejected once they got to the payroll office. All of these rejections were caused by clerical inaccuracies, rather than an inappropriateness of the transaction, demonstrating the need to simplify processing, document procedures, and increase process training.

The existing personnel computer system was ineffective, leading to a void of management information, over 130 redundant "shadow systems," and complex processing.

- *Lack of Critical Management Information:* MNO's human resource system was implemented in 1979 and had not been significantly upgraded since then. The university had no ability to track critical data such as total number and type of employees, total salary expenditure data, or employment histories including each individual's positions, salaries, promotions, or personnel actions while at the university. Because of this deficiency, more than half of all university units maintained their own computerized databases with personnel information—MNO had over 130 redundant shadow systems for personnel information, all with slightly different data. Obviously, the customers in the department found this information essential. The BPR team had to provide this information as part of the redesign.
- *System Did Not Support the Process:* With the exception of the mainframe computer, all process steps were manually driven, with manual interfaces between steps. In several cases, the departments had both a manual, paper file as well as an electronic spreadsheet; thus data were tracked twice even within one single department. All approvals had to be written on paper forms that then had to be mailed multiple times throughout the campus. At a minimum, the team believed that a redesigned process could use electronic mail, which would be instantaneous. The existing system also did not have an up-front edit function to prevent coding or data-entry errors. The lack of an effective system and the multiple approvals were the two primary drivers for time delays and costs in this process and were two issues that had to be addressed during visioning.

The lack of consistent, documented policies and procedures frustrated customers and also contributed to unnecessary costs.

- *"Shopping" for the Answer Desired:* In focus groups, customers loudly complained about the complete lack of documentation for policies and procedures. Employees who provided personnel services were also frustrated, as they could not turn to an accepted resource for procedures or policies. In fact, policies and procedures were so inconsistent in this highly

decentralized environment that customers frequently "shopped around" until they found the answer they wanted. Not only did this waste time, but it also demoralized the employees, whose decisions could be overturned by their peers.

- *Customer Ratings Point to Areas of Opportunity*: The customer ratings in exhibit 72 showed that customers placed very high priority on procedures (point J) and forms processing (point O), and rated the current performance rather low (at an average of 3.3 and 3.6 on a scale of 1 to 10, with 10 being excellent). These ratings support the comments from the focus group sessions. The very poor satisfaction ratings on employee orientation (point N) and on training (point M) reflected recent budget cutbacks that eliminated these programs entirely. The fact that employees rated training (point M) as the second most important service from the personnel area sent an important message to senior management regarding the recent cutbacks. Furthermore, the very low satisfaction ratings for applicant screening (point F) combined with the low-ranking importance of this service indicated that the personnel office should consider eliminating this service. During visioning, the BPR team considered each of these factors to redesign the process.

Recommendations and Results

Exhibit 73 summarizes the recommendations and expected results of BPR implementation. As in other case studies, MNO's senior administration needed to champion this improvement effort, as it crossed all departments and required a significant investment in systems. While the systems investment was substantial, savings of approximately $440,000 annually were projected. To achieve these savings, management had to be willing to reduce or reallocate staff.

In addition to the cost savings over time, MNO planned to dramatically increase customer service and to provide critical personnel information. Faculty and staff would be less frustrated by bureaucratic processing and departmental assistants would spend less time negotiating the process. Finally, the personnel and payroll staff could focus on the value-added services, such as giving advice or providing expertise, which ranked as the most important service from the customers' perspective.

BPR Summary

Using a limited number of BPR tools in a short timeframe, the project team quickly developed a high-level process assessment. The assessment quantified costs, projected savings, built a solid case for change across departments, and proposed a model for redesign as shown in exhibit 74. This analysis was quite timely, as the state had just decided to implement a statewide personnel system for all state universities. Thus, the state committed to funding systems improvements that removed cost barriers from improvement efforts. Additionally, departmental staff and chairs were desperate for timely access to accurate personnel information and thus were less hesitant to "do things the way we've always done them." Streamlining this process was clearly a win-win situation for the university.

Disbursing Financial Aid Awards

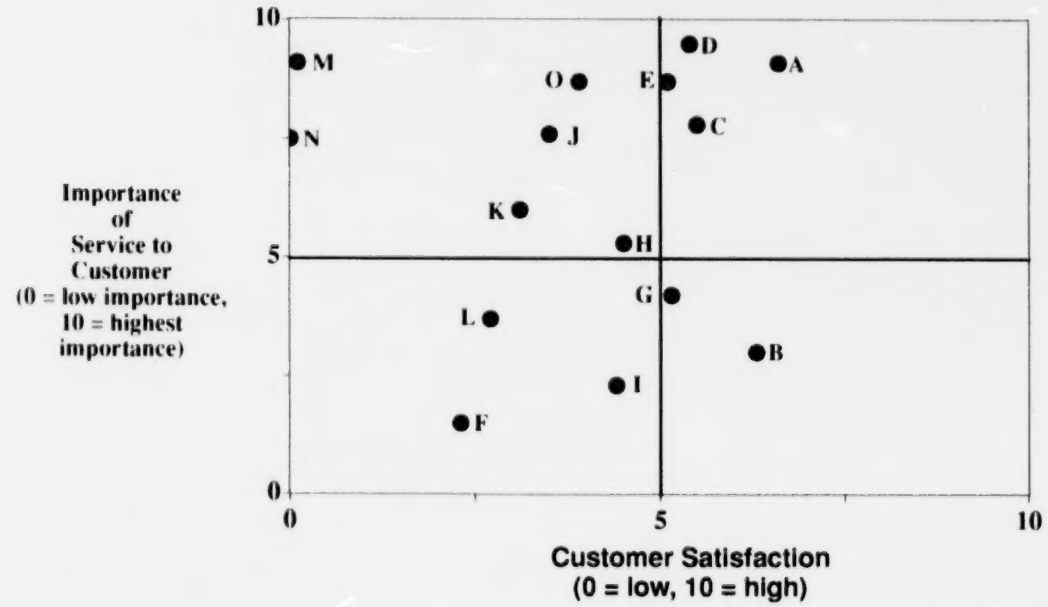
Background

PQR university is a medium-sized medical school with three campuses and approximately 4,000 students. PQR recognized that its students were frustrated because they were not receiving their financial aid payments fast enough. To address the problem, a cross-functional team was formed to analyze the process and recommend solutions that management could use to improve customer satisfaction. The team met once a week for three months and consisted of employees from the following departments:

- Financial Aid
- Accounts Payable
- Student Loans
- Business Office (Cashier)
- Grants and Contracts
- Management Information System

In their analysis, team members included financial aid disbursements from three sources: grants, internal loans, and external loans. The findings and conclusions section of this case study includes a description of the team's process in developing the recommendations to improve the financial aid disbursement process.

Exhibit 72.
Customer Ratings of Current Personnel Services, MNO University



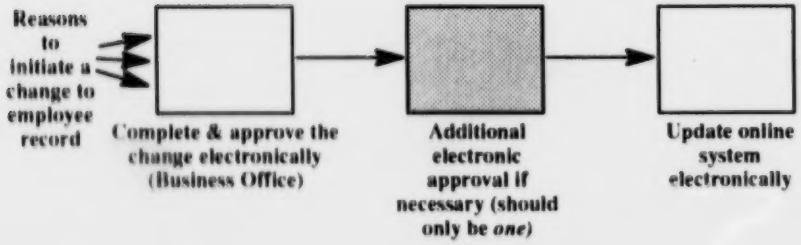
A = Enroll and counsel in benefits
B = Hire faculty and instructors
C = Sign up new employees
D = Provide advice, expertise
E = Recruit and post jobs
F = Screen applicants
G = Review job descriptions
H = Hire office, clerical employees
I = Protect university from lawsuits
J = Clarify and implement procedures
K = Review classifications and salaries
L = Notify candidates and make offers
M = Train and retrain
N = Provide new employee orientation
O = Process forms

Source: Customer Analysis

Exhibit 73.
Updating Employee Personnel Records — Recommendations and Results Table

Issue	Recommendation	Expected Benefits
Ineffective systems and lack of management information	■ Select and implement new human resource system with distributed access and distributed data entry ■ Implement new system as part of process redesign ■ Ensure that system provides up-front, on-line error checking for transactions ■ Eliminate use of redundant databases; train in on-line information access	■ Provide customer with on-line access to critical information ■ Allow for remote data entry and elimination of paper forms ■ Provide university with critical management information ■ Reduce costs
Complex processes with excessive approvals and errors	■ Based on new system, simplify process as in Exhibit 74. ■ Eliminate paper forms ■ Eliminate unnecessary approvals ■ Require all necessary approvals to be on-line ■ Train employees university-wide in new processes and systems	■ Significantly reduce costs ■ Cut processing time from the current 21 days to a possible 1-day turnaround ■ Eliminate 13,000 pieces of paper which flow through campus mail ■ Appropriately empower personnel employees and campus-wide personnel reps
Customer and employee dissatisfaction with undocumented, inconsistent policies and procedures	■ Create a customer-friendly guide to university personnel procedures ■ Create a customer-friendly, easy-to-understand guide to university policies ■ Create a guide to personnel services, contact names, and phone numbers	■ Provide employees with the readily available information they need to do a good job ■ Provide customers with easily accessible answers to their questions ■ Promote customer service attitude within Personnel Office and among campus-wide personnel reps

Exhibit 74.
Proposed Process to Change an Employee Record, MNO University


Reasons to initiate a change to employee record
Complete & approve the change electronically (Business Office)
Additional electronic approval if necessary (should only be *one*)
Update online system electronically

= Non-value-added

Key Points:

- All approvals are electronic
- Appropriate offices are given electronic access to the employee's record, rather than routing paper forms for their approval
- Personnel and/or Payroll Offices randomly audit transactions or approve them "after-the-fact," rather then delaying processing
- System does edit checking on data entry to reduce errors

Source: Process Flow Charting Analysis, MNO University

BPR Tools and Techniques Applied

PQR used customer analysis, process flow analysis, NVA assessment, benchmarking, and volume analysis to assess the financial aid disbursement process.

- Customer Analysis
  - Identified customer and employee expectations of the process through interviews
  - Quantified customers' ratings of importance of and satisfaction with services
  - Narrowed improvement efforts on areas that were high in importance and low in satisfaction
- Process Flowcharts with Value-Added/Non-Value-Added Assessment
  - Created a diagram of all steps required to disburse financial aid
  - Measured turnaround time to receive financial aid disbursement checks
  - Identified bottlenecks
  - Identified value-added and non-value-added steps
- Internal Benchmarking
  - Measured turnaround time to assess current performance of disbursement process
  - Compared current performance to customer expectations
  - Developed a measurement plan to quantify the process performance on a continual basis
- Volume Analysis
  - Quantified the number of checks issued for internal loans and grants
  - Quantified the percentage of checks applied to the students accounts and the percentage of checks cashed by the students

Findings and Conclusions

The team used customer analysis to determine where to focus BPR efforts and used the other BPR tools described above to improve customer satisfaction. The major findings and conclusions of the analysis are described below.

Through customer analysis and performance measurement, the team found that there was a gap between the customer's expectations of the financial aid disbursement process and the current performance of the process.

- *Prompt Receipt of Financial Aid Funds Was a Top Priority for External Customers:* The members of the team conducted face-to-face interviews with the internal and external customers as well as the managers of the process to better understand customer needs, expectations, and current satisfaction. Internal customers were defined as members of the university's administration who used financial aid information in their work processes or decision making. External customers were defined as the students applying for and receiving financial aid. The customers were asked to list their expectations of the financial aid disbursement process, rate the importance of the expectations, and rate PQR's current performance against those expectations.

  As anticipated, the most important expectation of students was prompt receipt of financial aid checks—also an area where they felt that PQR needed the most improvement. Most students at PQR were graduate students and depended heavily on financial aid funds to pay for living expenses. Clearly these students wanted to receive the funds as soon as possible. The internal customers also expressed timeliness of information as a major expectation. Although many customers identified other expectations, the team was under tight time constraints and chose to focus on the expectation that was rated the highest in importance and lowest in performance—timeliness of the financial aid disbursements.

  In addition, both internal and external customers provided the team with suggestions to improve the process, some of which were implemented immediately. For example, students were frustrated that they were not able to receive their financial aid check if they had an emergency loan. This was an issue when a student's account was already paid and the financial aid check covered the entire amount. The student was then required to apply the financial aid check to his or her account and then request a refund for the balance. If the student owed $300 for an emergency loan and had a grant check at the cashier for $3,000, the student had to endorse the check to PQR and wait approximately 6–9 days for a refund check of $2,700 (after having waited for that first check for $3,000 to be issued). During the interviews, one cashier told a team member that she

allowed students to write personal checks for $300 to PQR, and let them take the financial aid check immediately. Thus the students would receive their financial aid money faster and PQR would save processing time to cut the additional refund check for $2,700. This practice was implemented for all cashiers shortly after the interview was conducted. Other recommendations identified by the customers were considered throughout the process.

- *The Existing Process Did Not Meet Customer's Expectations*: Once the team decided to focus on the timeliness of financial aid disbursements, they measured how the process was currently performing (the turnaround time for a student to receive financial aid funds including external loans, internal loans, and grants). This measurement of turnaround time served as the baseline for benchmarking analysis and for measuring future performance.

  The team developed and used process flow diagrams to determine how to measure the total turnaround time for the financial aid disbursement process. The process flow for disbursing internal loans is included in exhibit 75. The team also prepared process flowcharts for disbursing external loans and grants. This case study focuses only on the team's work with the internal loan process.

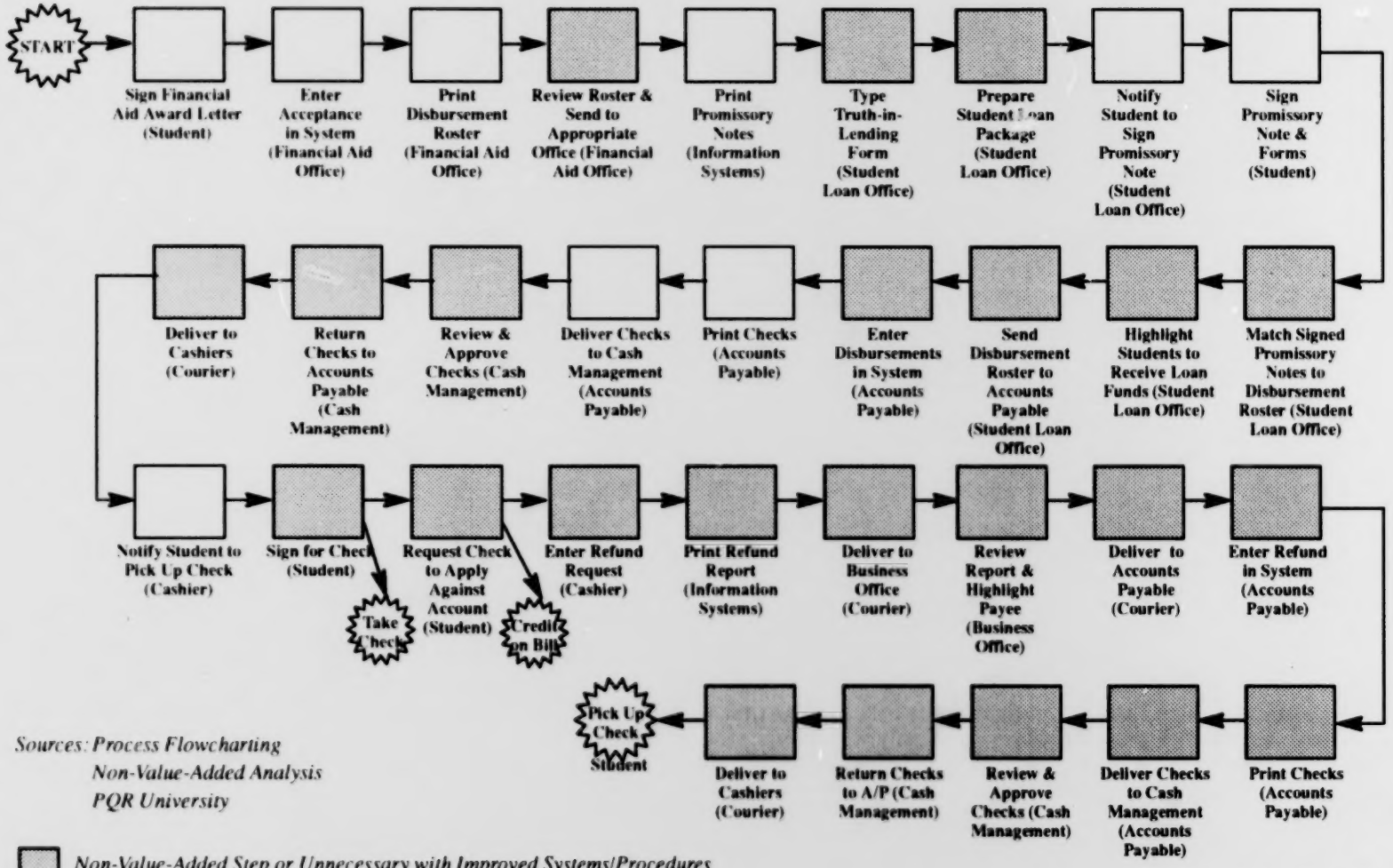
  As shown in the exhibit, PQR cut a check for the amount of the student loan for each student. The student then went to the cashier and picked up the check or applied the check to his or her account. If the balance of the student's account was greater than the check, the student could request a refund, and PQR would then initiate the refund process to cut a new check for the credit balance in the student's account. It is important to note that the student was allowed to use financial aid money for living expenses before paying tuition (the student could walk away with the initial internal loan check even though he had a balance due in his account). These practices led to duplication in the process, as more than one check could have been cut by the university. The practices also had a negative effect on PQR's cash flow because students wanted to apply financial aid to living expenses first and tuition second. If the students had their financial aid funds for living expenses, they had few incentives to come in and endorse any remaining financial aid checks over to the university.

  The team looked at the internal loan process in two parts—the turnaround time for a student to receive the initial internal loan check (left chart in exhibit 76) and the turnaround time for the student to receive a refund check if the internal loan check was applied to the account and the student requested a refund (left chart in exhibit 77). The team also measured the turnaround time of several sub-processes as shown in the middle and right charts of exhibits 76 and 77. As illustrated in exhibit 76, most students waited between 5 and 8 days to receive the initial internal loan check; however, a number of students waited over two weeks. Looking further at the sub-processes of producing an internal loan check, the bulk of the delay occurred from the date the interr[illegible] loan check was cut to the date the student picked up the check. After the internal loan check was received, most students waited another 6 to 9 days to receive their refund check (exhibit 77). The turnaround time for the two major processes and the sub-processes indicated that there was significant room for improvement. Reduction of just one day would have made a major difference for the student.

  The gap between customer expectations and the performance of the process was caused by a complex and manually intensive process with many NVA activities.

- *NVA Steps Were Causing Excessive Delays in the Process*: As presented earlier, the diagram in exhibit 75 presents the original process for a student to receive an internal loan disbursement. After measuring the current performance of the process and identifying problem areas, the team analyzed the process flow to determine the value-added and non-value-added steps (focusing on those subprocesses that take the most time). As indicated in the exhibit, the process was laden with non-value-added steps (25 out of 32 steps, or 78 percent), many of which resulted in excessive delays in the process. For example, significant time was spent delivering disbursement rosters, checks, and refund reports between departments. Further complicating the process, some departments *only* performed non-value-added steps which raised the question as to why they were

Exhibit 75.
Internal Loan Disbursement Process Flow, PQR University

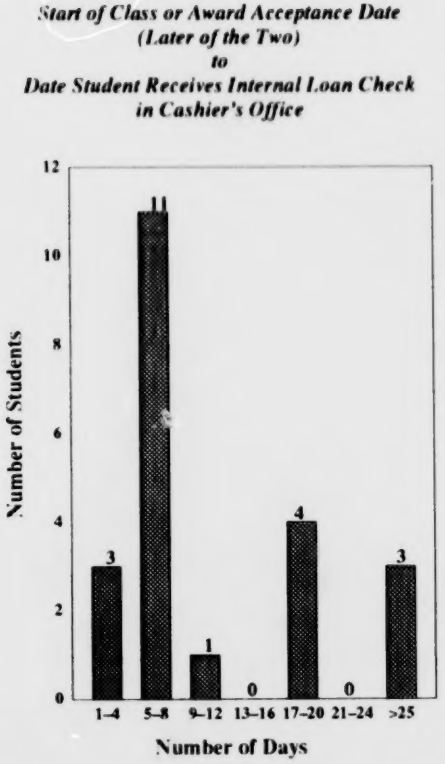

START
Sign Financial Aid Award Letter (Student)
Enter Acceptance in System (Financial Aid Office)
Print Disbursement Roster (Financial Aid Office)
Review Roster & Send to Appropriate Office (Financial Aid Office)
Print Promissory Notes (Information Systems)
Type Truth-in-Lending Form (Student Loan Office)
Prepare Student Loan Package (Student Loan Office)
Notify Student to Sign Promissory Note (Student Loan Office)
Sign Promissory Note & Forms (Student)
Match Signed Promissory Notes to Disbursement Roster (Student Loan Office)
Highlight Students to Receive Loan Funds (Student Loan Office)
Send Disbursement Roster to Accounts Payable (Student Loan Office)
Enter Disbursements in System (Accounts Payable)
Print Checks (Accounts Payable)
Deliver Checks to Cash Management (Accounts Payable)
Review & Approve Checks (Cash Management)
Return Checks to Accounts Payable (Cash Management)
Deliver to Cashiers (Courier)
Notify Student to Pick Up Check (Cashier)
Sign for Check (Student)
Request Check to Apply Against Account (Student)
Take Check
Credit on Bill
Enter Refund Request (Cashier)
Print Refund Report (Information Systems)
Deliver to Business Office (Courier)
Review Report & Highlight Payee (Business Office)
Deliver to Accounts Payable (Courier)
Enter Refund in System (Accounts Payable)
Print Checks (Accounts Payable)
Deliver Checks to Cash Management (Accounts Payable)
Review & Approve Checks (Cash Management)
Return Checks to A/P (Cash Management)
Deliver to Cashiers (Courier)
Pick Up Check
Student

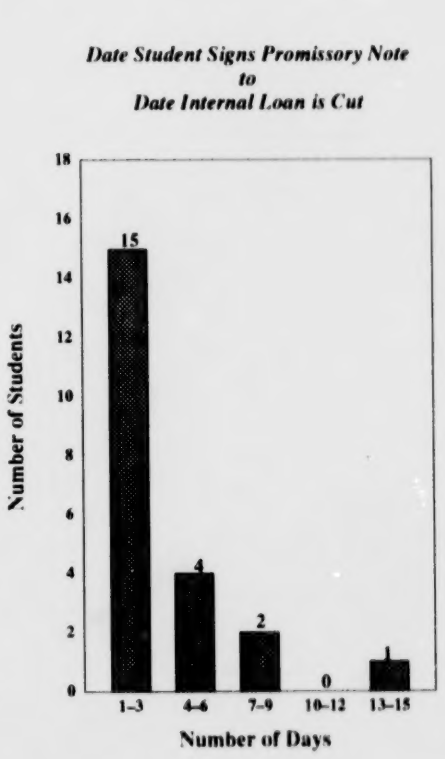
Sources: Process Flowcharting
Non-Value-Added Analysis
PQR University

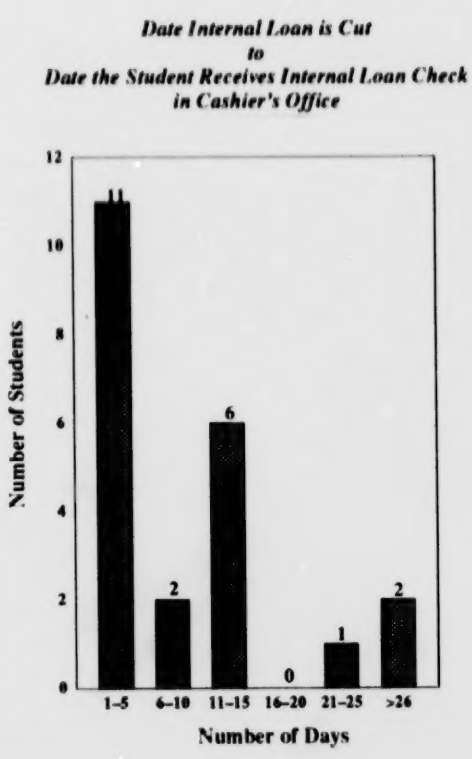
Non-Value-Added Step or Unnecessary with Improved Systems/Procedures

BEST COPY AVAILABLE

Exhibit 76.
Turnaround Time for Student to Receive Internal Loan Check, PQR University

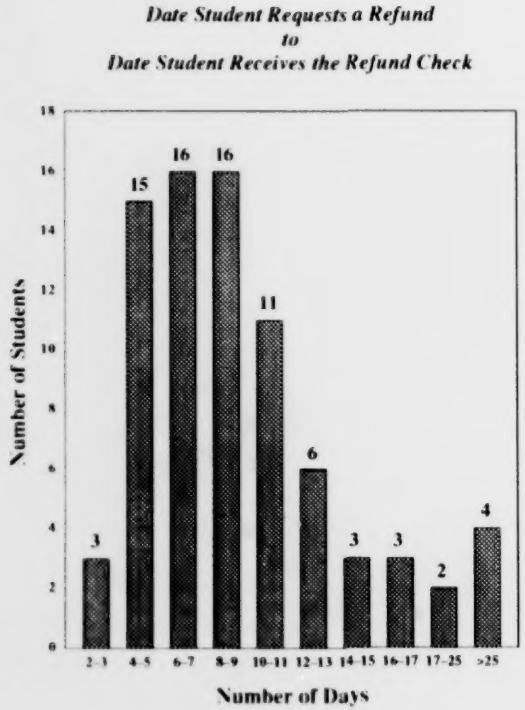


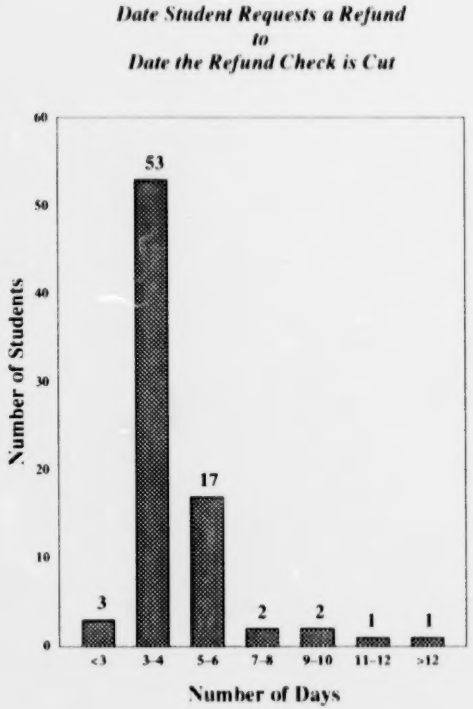


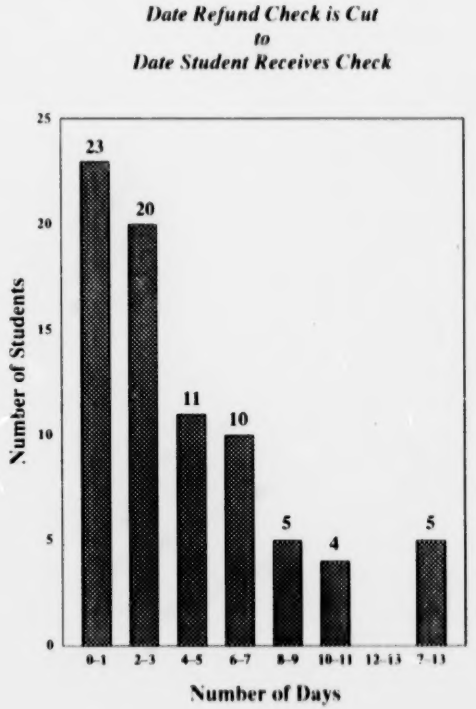


Source: Internal Benchmarking

Exhibit 77.
Turnaround Time for Student to Receive Refund, PQR University







Source: Internal Benchmarking

involved in the first place. For example, the business office received the refund report, reviewed, and highlighted the payee for accounts payable (A/P) in the system.

In conjunction with the other BPR tools, the team used a fishbone diagram to analyze the root causes of the problems identified. Exhibit 78 presents the causes for delays in students receiving refund checks. In many instances the NVA steps were the root causes for the delays. For example, the diagram indicated that one cause for the delay in refund checks was that A/P did not receive the refund report on a timely basis. In examining why the refund report was late, the team discovered that part of the hold up was that the business office took time to highlight the payee to make data entry for A/P easier. Why? Because the report format was confusing to A/P. Why? Because the report contained two payees—the student and the lending institution. This root cause analysis served as a basis for the team to develop recommendations (presented in the next section).

- *Producing Initial Internal Loan Check was an NVA Process*: In reviewing all the non-value-added steps involved with issuing the initial internal loan check, the team began to question why PQR produced the internal loan check instead of applying all financial aid funds to the student's account and cutting one check when there was a credit balance in the account. Separate checks were cut for each source of aid and the student chose whether or not to apply the check against his account. The practice of producing separate checks for all internal loans and other sources of financial aid was implemented partly due to the practice of allowing students to use financial aid funds for living expenses before tuition and partly due to lack of the technology to automatically apply financial aid funds to the account. The technology became available, but management was hesitant to apply the funds directly to the students' accounts because they believed most students needed the initial internal loan check to pay for living expenses. The team, however, collected data that indicated that 90 percent of the internal loan checks produced were endorsed to the school and credited against the students' accounts. Producing the initial check was a significant burden on the A/P department as well as a duplication of effort if a refund check was subsequently requested.

- *Complex and Paper-Intensive Processes Also Contributed to Delays*: The team applied the same analytical process to the disbursement of external loans and grants. The team discovered similar NVA steps that were causing delays in the process and developed recommendations to improve the timeliness of the disbursements. In the case of external loans, the team discovered that a major delay in the process was due to the external loan checks being sent to different departments throughout the campus. The checks then had to be routed to the financial aid office, logged in, copied, delivered to the business office, and then delivered to the cashier—all NVA steps. The cashier then notified the student to endorse the check, the student endorsed the check, and finally the check was deposited and applied to the student's account—again, a paper-intensive process. The team used the BPR tools to analyze the process and develop recommendations to improve the timeliness of disbursing external loans and grants.

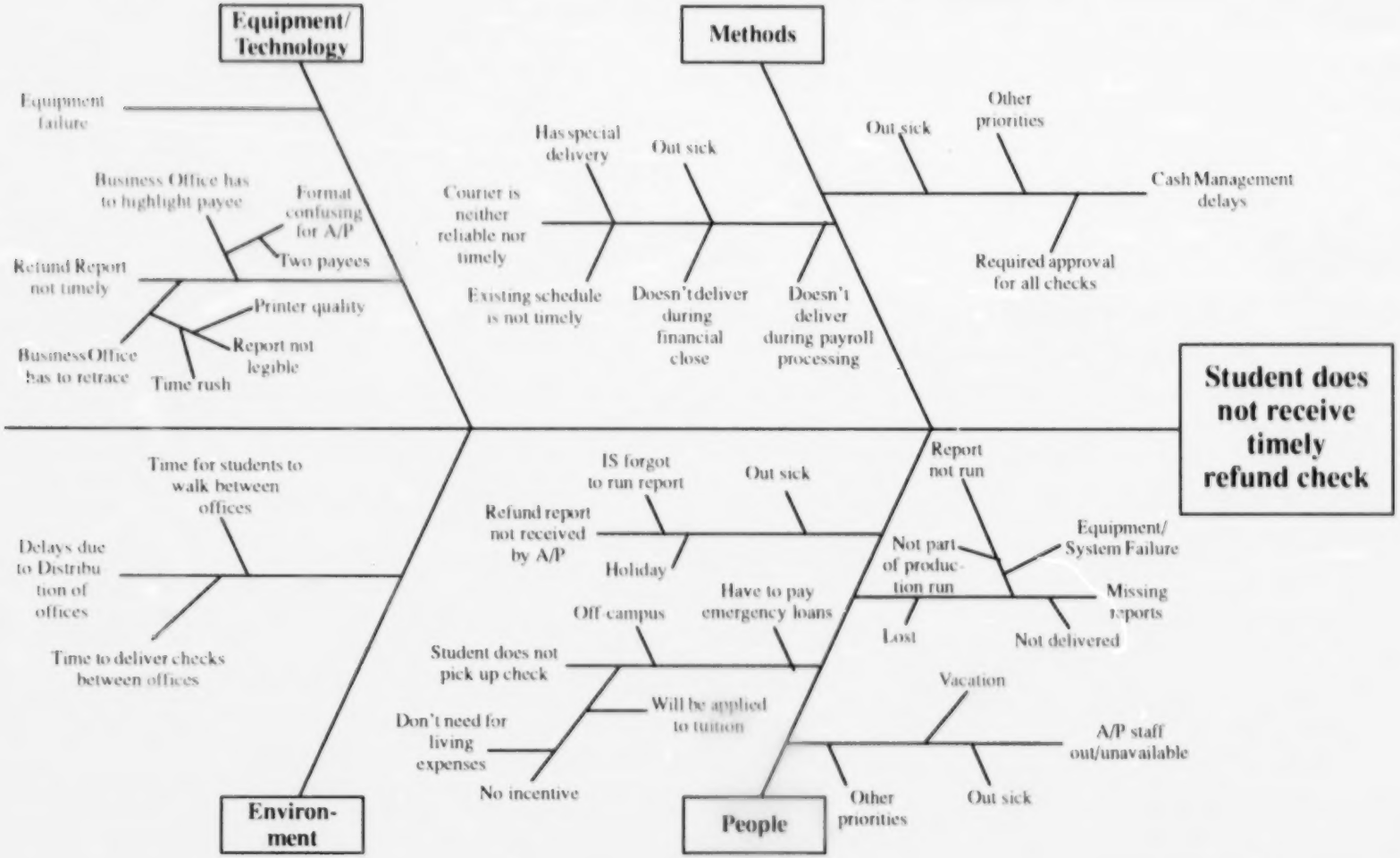
Recommendations and Results

The recommendations derived from the BPR analyses are summarized in exhibit 79. Implementation of these recommendations will significantly streamline the process as illustrated in the proposed redesign model in exhibit 80. The redesigned process will allow the PQR to improve customer service by dramatically reducing the turnaround time to distribute financial aid funds to the students. By streamlining the process in all areas, students should not experience an additional delay if they are required to pay tuition before living expenses. In fact, students should receive their refunds faster. This practice will motivate students to complete all financial aid applications early and will improve the cash flow of the institution. In addition, PQR will be able to reduce or reallocate staff to areas or tasks which will provide more value to the customer.

BPR Summary

In three months, the team used BPR tools to assess the process, develop recommendations,

Exhibit 78.
Root Cause Analysis — Refund Checks Not Received Timely, PQR University



Source: Root Cause Analysis (Not presented in BPR Tools chapter.)

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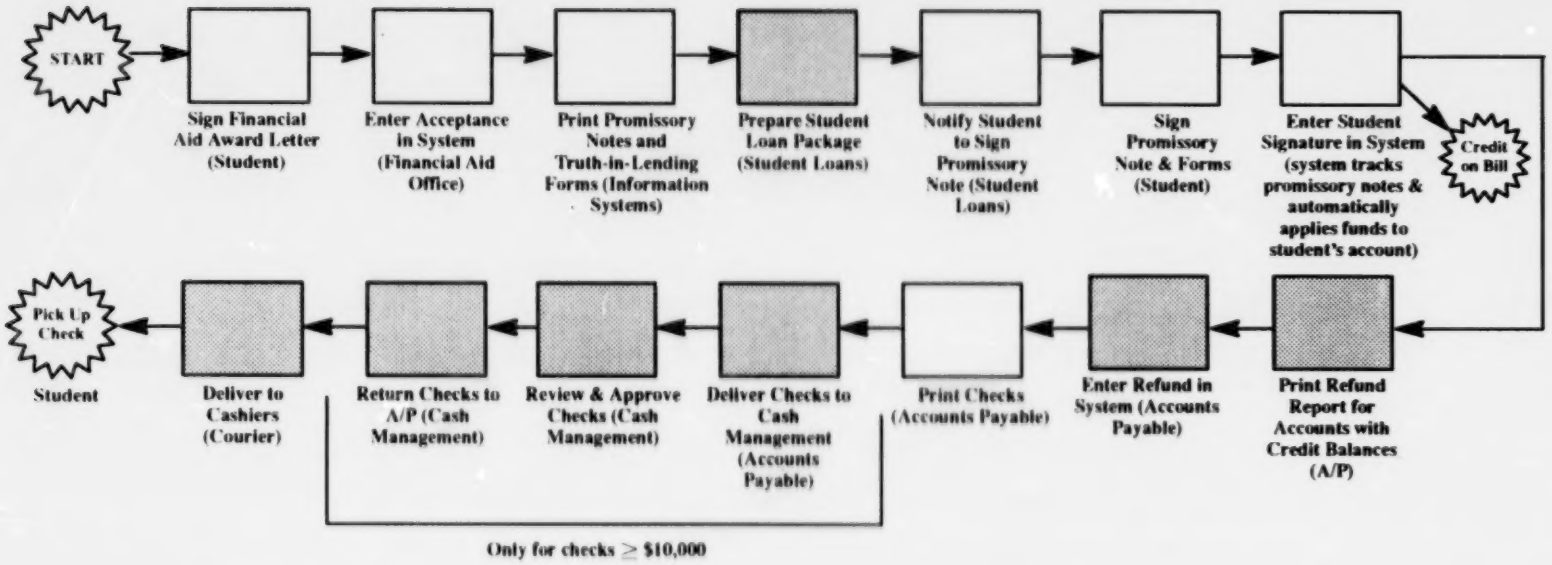
Exhibit 79.
Disbursing Financial Aid Awards — Recommendations and Results Table

Issue	Recommendation	Expected Benefits
Significant time is spent processing disbursement roster and internal loan checks when 90% of the checks are endorsed to the university and applied to the students' accounts.	■ Implement existing system module to automatically apply internal loan funds to student's account after promissory note is signed. ■ Automatically track promissory notes. ■ Eliminate disbursement rosters and internal loan checks. ■ Require students to pay tuition before receiving money for living expenses—issue check to student only if there is a credit balance in the student's account. (These recommendations also apply to grant processing which eliminates the need for the Grants Office to be involved in processing disbursements, as promissory notes are not required.)	■ Reduce turnaround time of the disbursement of internal loans. Student will receive credit on account immediately after signing note. This represents an improvement in turnaround time of approximately 2 days. ■ Reduce staff time due to elimination of disbursement rosters and internal loan checks. ■ Reduce staff time to handle lost checks, stopped payments, voided checks, and bank reconciliations. ■ Lower student receivable balance due to immediate credit against tuition.
Delays in the process are often caused by a lack of consistent courier service to transfer information between departments as well as other non-value-added steps in the process	■ The recommendations above will eliminate the need to deliver disbursement rosters and internal loan checks ■ Change the schedule of the courier for delivering the refund checks and other documents (the courier will deliver checks earlier in the day on a regular basis) ■ Eliminate the need for the business office to review and highlight refund report by redesigning the format to facilitate data entry in A/P ■ Print the refund report in the A/P office instead of the prior practice of printing it in the IS department, delivering it to the business office which then delivers it to the A/P Office ■ Eliminate Cash Management's review of refund checks less than $10,000 (the courier time to transfer the checks around and the time for cash management to review causes significant delays without adding significant control) ■ Automate the truth-in-lending form which is currently prepared manually	■ Reduces time to receive a refund check if student has a credit balance (2-4 days earlier) ■ Reduces costs
Significant time is spent processing external loans (certifying loans, receiving and distributing checks, obtaining signatures on the checks, depositing the checks, and applying the checks to students' accounts)	■ Certify loans on-line with lender ■ Process external loans through electronic funds transfer and automatically apply funds to student's account (eliminates sorting and distributing checks) ■ Until electronic funds transfer is established, set up a single post office box for receipt of all external loan checks ■ Eliminate copying all checks	■ Faster distribution of funds (approximately 2 days) ■ Reduces costs associated with processing checks

Exhibit 80.
Proposed Internal Loan Disbursement Process Flow, PQR University


START
Sign Financial Aid Award Letter (Student)
Enter Acceptance in System (Financial Aid Office)
Print Promissory Notes and Truth-in-Lending Forms (Information Systems)
Prepare Student Loan Package (Student Loans)
Notify Student to Sign Promissory Note (Student Loans)
Sign Promissory Note & Forms (Student)
Enter Student Signature in System (system tracks promissory notes & automatically applies funds to student's account)
Credit on Bill
Print Refund Report for Accounts with Credit Balances (A/P)
Enter Refund in System (Accounts Payable)
Print Checks (Accounts Payable)
Deliver Checks to Cash Management (Accounts Payable)
Review & Approve Checks (Cash Management)
Return Checks to A/P (Cash Management)
Deliver to Cashiers (Courier)
Pick Up Check
Student
Only for checks ≥ $10,000

Non-Value-Added Step or Unnecessary with Improved Systems/Procedures

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and develop a proposed model for redesign. The cross-functional team recognized the need to change and was enthusiastic about implementing the recommendations. Employee buy-in was a major step in implementing the successful redesign. Management also had to be committed to improving the process and supported the BPR efforts by communicating its dedication to the university community.

Glossary for Business Process Redesign for Higher Education

80/20 Rule: A rule of thumb used in calculating cost estimates as part of process flowchart analysis. Assumes that 80 percent of transactions are routine, will require close to the minimum number of processing minutes, and will involve the minimum amount of delays. On the other hand, 20 percent of transactions will be more complex, require greater resources, and experience greater delays.

Activity Dictionary: The list and corresponding definitions of each discrete activity performed within the department, process, or area being analyzed. An activity dictionary is used as part of work distribution analysis. It helps to ensure that employees have a common understanding of the defined activities as they respond on data collection forms.

Administrative Vision: The consensus built among senior leadership defining how the future ("post BPR") administration should operate. A limited set of broad, but clearly stated, principles or goals that will define the future administrative environment. See also vision/visioning.

Appraisal Costs: One of the four categories of costs resulting from poor quality. Appraisal costs include the cost of inspecting for errors, for poor quality, or for fraud (such as proofreading, key verification, approvals, etc.).

"As Is": Term used to describe the current process, costs, or situation. The "as is" description becomes the point against which future progress or changes are measured. "As is" process, costs, or situation is eventually compared to the "to be" process, costs, or situation.

Baseline: The description or measurement of an existing process against which future improvement can be tracked. Analogous to the "line drawn in the sand" which becomes the basis against which one measures changes.

Benchmarking: An ongoing, systematic process that compares the performance of one process, service, or function to that of other processes, services, or functions within the same institution, other institutions, or even other companies outside of higher education. There are four types of benchmarking: internal, competitive, industry, and best-in-class.

Best-in-Class Benchmarking: One of the four types of benchmarking where one searches across multiple industries to identify new, innovative ways to conduct business, no matter what the source of the ideas. The most advanced and usually most effective form of benchmarking.

"Blue Sky:" Term used in brainstorming where an individual or team assumes that there are no limits—they can reach as high as the "blue sky" to generate ideas.

Breakpoint: The strategic competitive advantage an institution can obtain in cost, quality, cycle time, or service that has enough customer and stakeholder appeal to shift the market in its favor or dramatically impact its operations. Once these critical targets are identified, many types of improvement methods work interactively to achieve the goals, using a fast-paced timeline and technology support to speed change. (adapted from Carr, David et al., *Breakpoint Business Process Redesign* in the Coopers & Lybrand Performance Solution Series (Arlington, VA: Coopers & Lybrand, 1992), p. 25.)

Business Case: An executive-level document or presentation that summarizes the analyses and conclusions regarding defined issues and that proves the need to change the current mode of operation. Often developed using analytical tools described in this publication. Usually a combination of both quantitative and qualitative information.

Business Process Redesign (BPR): A managerial approach that incorporates institutional strategy, work processes, people, and technology to improve performance radically and to create sustainable competitive advantage by challenging and redesigning the core business processes of an institution using operational, technical, and change management expertise in a unified way.

BPR Master Plan: Usually a one page document or diagram that serves as a planning and communication tool for ongoing BPR efforts. The master plan identifies the various *potential* BPR initiatives, the approximate duration of each initiative, and the relative start dates for each initiative. Focuses on the long term plans and goals of the institution with respect to BPR.

BPR Team: The group of the "best and brightest" analysts and staff who analyze the current process, communicate their progress and ideas to campus constituencies, develop redesign ideas and processes, develop implementation plans, and help to lead implementation efforts. Usually one BPR team focuses on one core process and is comprised of approximately five to nine staff from a variety of areas within the institution.

"Buy In:" The support needed from a broad base of campus constituents in order to effectively persuade the campus to implement changes and redesign ideas.

Change Management: Focuses on, evaluates, and manages the human resource and environmental impact of a process redesign on an organization. Often the most overlooked part of BPR, yet the most important set of issues that will determine the long-term success of BPR implementation.

Competitive Benchmarking: Analysis and comparison of one's own processes, services, or functions to targeted data from a select, small group of direct competitors or peers.

Conceptual Model: The high-level description of the redesign of a process. Conveys the key attributes, major policies, and most significant steps in the new process. Provides sufficient basis to make a go or no-go decision for implementation.

Continuous Improvement: The small but regular gains made through daily attention to enhancing how work is done. Taken together, these small gains often lead to significant results over the long term. The foundation for Total Quality Management initiatives. (from Carr, David and Ian Littman, *Excellence in Government: Total Quality Management in the 1990s* (Arlington, VA: Coopers & Lybrand, 1990), p. 20.)

Core Business Process: A specific type of process which is complex and has sub-processes; adds value; is important to both the organization and to customers; crosses functional lines within the institution; extends beyond the organization in that it has an *external* customer; defines performance by the customer's requirements; bases final, key output on customer's needs. Most universities will have a limited number of core business processes, usually between eight and twelve.

Cost of Quality (COQ) Analysis: Categorizes and quantifies the costs associated with non-value-added activities. There are four categories for costs of quality: external failures, internal failures, appraisals, and prevention. The first three categories are negative and should be eliminated or reduced over time. The last category, prevention, is the only positive, constructive cost of quality and will usually increase slightly over time as the organization becomes more effective and improves quality.

Customer: The person to whom a product or service is delivered; the endpoint in the process.

Customer Analysis: One of the many analytical tools used in BPR. Measures both current and ongoing customer satisfaction, identifies key areas for improvement, explores customer ideas for redesign, and identifies potential future customer needs.

Customer Voice: Term used to describe the customer's perspective or opinions. The "customer's voice" should be the cornerstone of the redesigned process.

Executive Steering Committee (ESC): The group of high-level executives within the institution that "sponsors" and guides the BPR initiative. ESC members play an especially important role in developing broad campus support for change and leading change management initiatives.

External Customer: An individual or organization outside the administration of a college or university that receives a service, information, or product from the institution. A core business process should ultimately deliver its output to an external customer.

External Failure Costs: One of the four types of costs of quality—the worst type. Includes all costs associated with correcting a situation where a defective or inappropriate output is delivered to an external customer. May include complaint investigation, client communication, compensatory claims, cost of replaced goods, etc.

Flow Time: See lag time.

Force-Field Analysis: A brainstorming exercise where BPR team members review a list of change areas or initiatives and record their opinions regarding the ways in which current policies and culture may be "forces for" or "forces against" administrative changes resulting from BPR.

Fragmentation Ratio: The fragmentation ratio is the total number of employees (headcount) performing an activity divided by the number of full-time-equivalent employees performing that same activity. A high fragmentation ratio implies that a large number of staff individually spend small amounts of time on the particular activity. Of course, some activities should have high ratios (such as planning, problem resolution, program development, or participation in committees), as they support consensus building, collaboration, and cross-functional activities. However, most business-related activities do not usually require this approach and should not be as highly fragmented. This ratio helps the BPR team identify activities that can be consolidated to one (or just a few) employee(s) to improve processing and use of resources.

Functional Silos: Term used to describe functional areas as rigid and isolated as opposed to flexible, responsive, and cross-functional. Analogous to tall grain or factory silos (towers) whose walls would be nearly impossible to surmount and cross.

Gap Analysis: An analytical approach to analyzing benchmarking data. Used to assess the significance of the difference in performance between two or more institutions. Also used to assess the difference between the customers' expectations and the current performance of the process under review.

Industry Benchmarking: Analysis of and comparison to general trends across a large group of related institutions within the same industry. Closely parallels competitive benchmarking but implies a broader perspective.

Internal Benchmarking: Analysis of existing internal practices within various departments or divisions of the institution. Goals are to measure the baseline, or initial, level of performance as well as to identify best *internal* practices which may be adapted for use in other areas of the same institution. Usually used in the earliest stages of a benchmarking initiative.

Internal Customer: An individual or department within the administration of a college or university that receives a service from another staff member also within the administration. While it is important to meet the needs of internal customers, ultimately BPR and all processes must focus primarily on the needs of external customers.

Internal Failure Costs: One of the four categories of costs of quality. Includes costs stemming from two types of poor quality: time spent correcting errors before the product is sent to the customer and time and money wasted as a result of poor process design. Examples include the costs of redoing work, correcting mistakes, experiencing delays, processing requests for special handling, and other forms of waste or poor process design (moving transactions from desk to desk, setting up to prepare for work, batching forms, sorting, etc.).

IT: Abbreviation for information technology.

Lag Time: Time in which no one is working on a transaction. Usually measured in days as opposed to minutes. Lag time should be assigned to each step in the process. Includes time spent waiting in an "in box," going through US or campus mail, waiting on a person's desk, or waiting for additional information before continuing processing, to name a few. Also called delay time, flow time, or wait time.

The Five M's of Management: Management, Manpower, Manufacturing, Marketing, and Materials. These five categories are used to help focus and categorize findings and conclusions derived from BPR analytical studies, particularly the process flow charting BPR tool.

Management: One of the "Five M's of Management." The supervisors/managers who oversee the work. Findings and conclusions relating to "management" might focus on policies, procedures, assignment of work responsibilities, performance measurements, controls, goals, etc.

Manpower: One of the "Five M's of Management." The staff members who actually perform the work. Findings and conclusions relating to "manpower" might focus on training, cross-training, skill mix, overdivision of labor, etc.

Manufacturing: One of the "Five M's of Management." The work process itself. Findings and conclusions relating to "manufacturing" might include steps in the process, current automation, duplication in the process, inspections, value-added versus non-value-added, control steps, error rates, bottlenecks, complexity, etc.

Marketing: One of the "Five M's of Management." The customers and communication with those customers. Findings and conclusions relating to "marketing" might include customer needs and expectations, types of customers, methods of communication, number and type of customer interactions, etc.

Materials: One of the "Five M's of Management." The equipment, supplies, forms, and resources that are the input into a process. Findings and conclusions relating to "materials" might include types or format of forms, opportunities for automation, type and sufficiency of exiting equipment, etc.

Net Present Value: A project's net contribution to an institution's long term wealth; the present value of the long term contribution minus the initial investments. Formula:

$$NPV = C_0 + \sum_{t=1}^{n} C_t/(1+R)^t$$

where C_0 is the cash flow at time period zero, C_t is the cash flow at time period t, and R is the interest rate.

Phase I—Discover: The first of three phases in business process redesign. Objectives of this phase are to build sponsorship, lay the foundation for change, identify and prioritize opportunities to improve the institution's administrative process radically, and prove the need for change.

Phase II—Redesign: The second of three phases in business process redesign. Objectives of this phase are to analyze the selected process(es) in detail, identify technological solutions to enable change, innovate, redesign, and develop implementation plans.

Phase III—Realize: The third of three phases in business process redesign. Objectives of this phase are to finalize implementation plans and then implement the redesigned process, including changes in policies, organization, work procedures, staff assignments, staff displacement, training, and technology.

Prevention Costs: One of the four categories of cost of quality. The only positive, constructive cost of quality. The cost of preventing problems and eliminating errors at the source (e.g., the costs of training and awareness programs). Over time, prevention costs usually will increase slightly as the organization becomes more effective and improves quality.

Process: A series of linked activities that adds value to an input to create a service or product for a customer.

Process Flow Chart: A step-by-step diagram of how work is done in a particular process.

Process Flow Chart Analysis: Creates a step-by-step diagram of how work is done in a particular process. Tracks a wealth of data about that process such as costs, time, delays, and errors. One of the most effective BPR tools for improving work flow and eliminating unnecessary work.

Process Owner: The person within the organization who has the authority and influence over a cross-functional process to implement changes within that process. Usually the leader of the BPR team responsible for that process. Ultimately will

be responsible for managing the redesigned process on a long-term basis and will be held accountable for the results of the BPR team.

Process Teams: A group of approximately 6 to 10 people who are responsible for redesigning one cross-functional, core business process. Drawn from a cross-section of functions within the process, including customers. Desirable attributes for team members include: the "best and brightest" on campus, strong analytical ability, design skills, political savvy, understands the potential of technology, team players, open to change, and persistent. All team members will not have all of these qualities, but the team members *should* embody all above qualities.

Project Leader: The person who reports to the project sponsor and then plans and manages the daily aspects of the BPR initiative(s). Identifies and secures resources, provides infrastructure, maintains schedules, tracks and reports progress, resolves project issues, etc.

Project Sponsor: The "person who has enough authority over all stakeholders in the processes that will undergo reengineering to ensure that reengineering can happen." Often the president of the institution. If the focus of the BPR effort is on administrative and support services, the sponsor (and thus the change agent) could be the vice president for finance and administration. (quoted definition is from Hammer, Michael and James Champy, *Reengineering the Corporation: A Mainifesto for Businss Revolution*. New York: Harper Business, 1993, p. 104).

Root Cause: Phrase to describe the most basic reason or factor that is causing the problem under study. Refers to focusing on and correcting these basic factors, rather than simply focusing on the *symptoms* of the problems.

Scope: Refers to the breadth of the BPR project, the areas to be affected by the BPR project.

Semi-interquartile Range: Semi-interquartile range is a substitute for standard deviation as a way of identifying significant differences in performance. The semi-interquartile range is a measure of how spread out or dispersed the data are. It is calculated on the basis of quartiles within a distribution. The upper quartile (Q_3) is the point below which 75 percent of the cases fall, and the lower quartile (Q_1) is the point below which 25 percent of the scores lie. Thus, the semi-interquartile range indicates the range of scores within which the middle 50 percent of the scores lie (i.e., clustered around the median). Because this index is a measure based on middle scores rather than extreme scores, its use is more stable than the use of standard deviation, particularly in cases where there is not always a single, normal distribution. It should be noted that the addition of one deviant case at either extreme for a distribution would leave the semi-interquartile range virtually untouched. The NACUBO Benchmarking Project chooses to use median scores and the semi-interquartile range to mitigate the effects of extreme scores in the national benchmark data. Polit, Denise and Hungler, Bernadette, *Nursing Research, Principles and Methods*, second edition, Lippincott, Philadelphia, 1983.

Stakeholder: An individual who has a long-term, vested interest in the process being studied. May include employees, managers, and/or customers.

Systems Requirements: An organization's criteria for an effective, new information technology system. Usually a structured, formal written document that is used either to evaluate vendor proposals or to manage the development of custom software.

"To Be:" Used to describe the future, reengineered process, costs, or situation. Used as a comparison to the "as is," current version of the process, costs, or situation. Also called the "to be vision."

Total Quality Management (TQM): A set of principles, tools, and procedures that provide guidance in the practical affairs of running an institution. An institution-wide program that involves all employees in controlling and continuously improving how work is done, in order to meet customer expectations of quality. Usually accepts the status quo as the basis for improvement, as opposed to BPR which is employed when more radical improvements are needed.

Touch Time: The typical number of minutes an employee spends actually working on the transaction in an activity. Usually measured in minutes. Touch time should be assigned to each step in the

process. When touch time is correlated to an employee's salary, cost estimates for each step and for the process as a whole can be calculated.

Trades Shops: The technical areas of expertise in a facilities operation, such as carpentry, electrical, plumbing, etc.

Transaction: The item or person that flows through a process, consumes inputs, and is transformed into an output. In service industries, usually a piece of paper (such as a purchase order or a student application for admission) or a person who receives service (such as a student registering for classes).

Transaction Volume: The number of individual transactions that flow through a process or a particular step in the process. Data recorded as part of the flow chart analysis to contribute to cost estimates or as part of volume analysis to assess approval structures or workload over time.

Value-Added/Non-Value-Added Analysis: Distinguishes between those activities that are truly essential from the customer's perspective (i.e., have value) and those that are not essential to the customer and should be minimized or even eliminated from the process over time.

Vision/Visioning: The method that a BPR team may use to develop the design for the reengineered process. Usually an intense series of brainstorming sessions with the BPR team and a facilitator. See also "Administrative Vision."

Volume Analysis: A BPR analytical tool that evaluates the different types and numbers of transactions that flow through a process. Can be used to assess approval structures or appropriateness of the segmentation of transaction types. Can also be used to assess changes in employee workload over time.

Work Distribution Chart (WDC) Analysis: Describes and analyzes the staff time and costs expended on activities within a department or process. The objectives of this tool are to identify the core activities that comprise a unit or process and then to estimate the corresponding time and dollars expended on each of these activities.

Work Order: One of the major types of transactions that flow through a facilities (physical plant) department. Usually is the form that tracks a customer request for work in the campus facilities department (such as a request to repair a leaky sink or to install new bookshelves).

Workload: The volume of transactions processed per employee as part of a particular process.

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Appendix A

Work Distribution Chart: Sample Forms

Work Distribution Chart
Sample Activity Dictionary for a Small College's Administration

Accounting/Financial Services

110	Budget Tracking	Track or manage over/under expenditures.
115	Budget Reporting	Prepare budget reports. Create, maintain or provide support to the college's accounting and budgeting systems. Manage, maintain, update, and generate reports from the General Ledger System.
120	Purchasing	Purchase equipment and supplies, prepare requisitions. Administer contracts with vendors, professional service providers and others on behalf of the college. Negotiate contracts with vendors, professional service providers, and others.
130	Accounts Payable	Mange, monitor, make entries to accounts payable system.
135	Accounts Payable Adjustments	Make adjustments to accounts payable system; resolve errors; resolve vendor complaints or discrepancies.
140	Accounts Receivable	Manage, monitor, and make entries or adjustments to accounts receivable system.
145	Accounts Receivable Adjustments	Make adjustments to accounts receivable system; resolve errors, resolve customer complaints or discrepancies.
150	Petty Cash	Review, transmit, and comply with university regulations.
160	Travel Management	Develop, interpret, or apply policies relating to travel authorization and reimbursement.
170	Inventory, Equipment, and Supplies	Conduct inventories of equipment and supplies
180	Audits	Review and investigate procedures and systems to ensure the accuracy of information and data.
190	Chart of Accounts/Standards	Develop, revise, and advise on chart of accounts and financial reporting standards.

General Supervision and Management

210	Direct Supervision	Plan, control, review, and verify work of employees reporting directly to you; complete employee performance evaluations.
220	Indirect Supervision	Plan, direct and control the work of people who do not report directly to you, but who provide support to the goals and objectives of your unit.
230	Training	Give or receive on-the-job training; attend (as a participant) professional development programs.

Computer Services and Support

310	Technology Planning	Develop plans for the enhancement, maintenance, and use of technology; evaluate use and quality of existing systems and user needs

320	■ Computer Operations	■ Operate and maintain the computer system; allocate CPU time; manage/maintain equipment and other computer resources.
330	■ Programming, System Development, Database Management	■ Code data processing programs and systems. Design, develop, or refine databases (not data entry). Design new data processing systems, applications, standards, programs, and procedures.
340	■ Computer Selection and Implementation	■ Identify user requirements, evaluate software alternatives, or make recommendations for the selection and upgrade of software and/or hardware.
350	■ Systems Training or Consultation	■ Train and consult with staff in systems usage and data processing.
360	■ Systems Troubleshooting and Repair	■ Work to resolve various system errors and failures. Identify system problems and implement corrective action.

Direct Student, Academic, or Community Services

410	■ Academic Counseling	■ Course advisement; counsel students on academic probation, etc.
420	■ Personal Counseling	■ Crisis intervention; conduct individual or group psychotherapy; plan or conduct "life skills" programs
430	■ Extra Curricular Student Activities	■ Plan, coordinate, support, or conduct student activities on campus, such as student newspaper, volunteer students, student organizations, Ag Field Day, etc.
440	■ Recreation Activities	■ Develop or manage programs, pool operations, CPR, lifeguard, aerobics certification, sports, safety evaluations, etc.
450	■ Admissions and Recruitment	■ Plan or conduct applicant information sessions, visits, post-admit letters and marketing; coordinate recruitment activities with the central Admissions Office; review applications.
460	■ Professional Development	■ Develop, coordinate, support, or conduct training sessions, speeches, conferences, or other related activities; work directly with professional societies, farmers, or agricultural associations.
470	■ Scholarships	■ Determine, award, or track scholarships.
480	■ Sales	■ Sale of agricultural products or services and the distribution of income from them.
490	■ *Direct* Student *Administrative* Services	■ Registration, check cashing, grade reporting, transcripts, financial aid disbursement, etc.

Grants & Contracts Management

510	■ Grant and Contract Administration	■ Coordinate, allocate, or track state, federal and grant funds, including fulfilling all regulatory requirements.
520	■ Proposal Preparation	■ Secure, edit, or prepare grant or contract proposals. Identify or track proposal opportunities.

530	■ Audits	■ Ensure compliance with grant or contract agency rules and regulations; audit proposals; audit expenditures.
Internal Communications		
610	■ Liaison	■ Liaison among units or individuals within the college or the larger university community; communicate information to the appropriate personnel.
620	■ Internal Memorandums	■ Prepare, complete, or distribute newsletters, fax bulletins, or other mediums to communicate the college's policies and programs to departments.
630	■ Meetings	■ Plan, conduct or attend activities/meetings to provide communication within or between departments with the college, including routine staff meetings, departmental meetings, etc.
640	■ University Committees	■ Plan, chair, or participate in university–wide or local college committees.
650	■ Problem Resolution	■ Resolve problems resulting from inaccurate or insufficient internal communications.
Payroll		
710	■ Payroll Operations	■ Manage and monitor payroll operations including check distribution, reports for Bureau of Labor Statistics and Department of Labor, preparation and review of PDRs and PAFs, etc.
720	■ Time Recording	■ Complete, monitor, or audit time reporting, service reports, or absence records.
Personnel		
810	■ Internal Information Systems Support	■ Design, monitor, maintain or provide consultation and training to college staff on Personnel system.
820	■ Internal Personnel Administration	■ Perform personnel–related activities such as hiring, benefits counseling, or completing PARFs, PDRs, or PAFs.
830	■ Position Control	■ Develop, evaluate and revise position descriptions for staff. Track existing positions, new hires, ranges, LARFs, PARFs, etc.
840	■ Special Tasks	■ Record keeping, international VISA preparation, central benefits coordination, affirmative action, FASPs.
850	■ State and Federal Regulations and Rules	■ Interpret and apply state and federal regulations and rules.
860	■ Budget Control	■ Monitor or audit above–the–line personnel budget expenditures.
870	■ Promotions and Re-Appointments	■ Document or process faculty re–appointments (3 year and 1 year) and promotions.
880	■ Merit Awards	■ Process faculty FASIPs and administrative staff merit awards.
890	■ Problem Resolution	■ Resolve problems relating to Personnel Office or personnel information.

Planning

910	Strategic Planning	Develop strategic plans/strategies for the college or its departments.
920	Academic Program Development	Advise or coordinate departments developing new academic programs; evaluate proposals for new academic programs.
930	Budgeting	Evaluate and determine allocation of financial and capital resources among departments.
940	College Research	Prepare research on enrollment, retention, admissions, financial aid, financial statistics, etc. for the college.
950	Planning and Policy Development	Plan internal college programs/activities; develop or modify internal policies, rules, procedures.
960	Process Redesign	Review, modify, and develop internal college procedures or processes
970	Fund Raising	Provide advice or support to the college regarding fundraising strategies, prospects, or technical issues for individual or corporate donations.

Public Relations/External Communications

1010	Special Events	Plan or organize college special events, convocations, symposia, dinners, concerts, etc.
1020	Advocacy	Correspond or meet with legislators and other public officials on behalf of the college. Represent the college on state committees and task forces; serve as liaison between the college and other state agencies.
1030	Media Relations	Act as spokesperson for the college and develop press releases.
1040	Printing Services	Provide support for or supervise printing services including brochures, press releases or other printing services as requested.
1050	External Communications	Editing, printing, copying, photography, audio visual, or publication distribution. Write or produce promotional, research, or statistical reports and publications.
1060	Public Relations Advice	Provide advice and assistance to the college on editorials, products, media or community relations issues.
1070	Client Relations	Correspond or meet with support or advisory groups; serve as liaison with campus groups.
1080	Problem Resolution	Resolve problems resulting from inadequate or inappropriate public relations materials; resolve problems resulting from uncoordinated marketing efforts, etc.

Reporting

1110	Federal or State Reporting Requirements	Respond to federal or state agency requests for data and reports on behalf of the college and prepare reports for college, university, state, or federal use.
1120	Financial Reports	Preparation of financial reports for college, university, state, or federal use.

1130	■ Grant or Contract Reports	■ Respond to granting agency requests for data and reports on behalf of the college and prepare reports for university, state, or federal use.

Secretarial and Clerical Tasks

1210	■ Records Management	■ Maintain and manage records and archives.
1220	■ Secretarial Tasks	■ Make appointments or schedule meetings; prepare reports and complete other projects assigned; fax documents; prepare routine correspondence.
1230	■ Clerical Tasks	■ Organize, file, order office equipment, perform other routine tasks.
1240	■ Telephone/Visitors	■ Answer telephones; take and distribute messages; greet and direct visitors.
1250	■ Word Processing	■ Edit, format, or input data or other material using word processing equipment.
1260	■ Mail Support	■ Organize and complete steps necessary to perform bulk mailings; process or supervise mail operations including incoming and outgoing mail delivery, and postage sorting.
1270	■ Photocopying	■ Perform photocopying services such as duplicating, binding and preparing special reports.
1280	■ Data Entry	■ Perform data entry services; keypunching.
1290	■ Delivery/Transport	■ Deliver material between the college and the central university administration.

Sample Cover Letter for Work Distribution Survey

Date: _____

To: **XYZ College Administrative Employees**

From: **President**_____

Re: **Business Process Reengineering — Attached Survey**

In my memo dated _____, I alerted you that a survey would be distributed as part of the current BPR initiative. Enclosed is that survey, including instructions, an activity dictionary, and a data collection form.

This survey will help XYZ College to understand, for the first time, the actual and *specific* resources which support each of our administrative services and activities. Understanding these resources, both quantitatively and qualitatively, is absolutely critical to any future redesign efforts. We must understand our current operating environment and must be able to measure changes and improvements over time.

I hope this survey is not too burdensome. As an estimate, it will probably take about 30 minutes of your time. I understand that you and your staff are operating under increased workloads. Your additional efforts on this BPR initiative will help up to reduce some of that workload in the future. The BPR project is operating under a very aggressive schedule; it is essential to complete and return the survey to _____ by _____.

I certainly appreciate your contribution in completing these surveys and supporting the BPR improvement process.

Sample Instructions for Completing the Work Distribution Chart Data Collection Form

Instructions for Completing the Work Distribution Data Collection Form

Completing the attached form should take approximately 30 minutes of your time. If you have any questions about the directions, please feel free to contact _____ at _____. Please return your completed form to _____ no later than _____.

Purpose:

A work distribution analysis helps to *quantify* information about an organization or function. It can objectively focus attention on the most important activities which take up the most employee time and therefore might yield the greatest benefit from improvement efforts.

Who Should Complete the Work Distribution Data Collection Form?

Every employee in XYZ College's administration should complete his/her own form. It is important to receive 100% response rate to complete the data analysis.

How to Complete the Data Collection Form:

1. Begin by reading through the attached "Activity Dictionary" to familiarize yourself with the overall list of activities/responsibilities.

2. Identify the activities or responsibilities which account for significant portions of your time (at least 5 percent) over the course of a year. Please select no more than 20 activities/responsibilities.

3. List the activities/responsibilities you have chosen on the Data Collection Form, along with their 3 digit activity code.

4. Go down the far right column of the Data Collection Form, allocating your time in percentages across the list of activities/responsibilities. Remember – just *estimates*, absolute precision is *not* important.

5. Please be sure that the percentages for your activities sum to 100%.

Please return your completed form to _____
no later than 4 PM _____.

Sample Work Distribution Chart Data Collection Form

Work Distribution Chart Data Collection Form

Name: _____ Dept.: _____
Job Title: _____ Phone Number: _____
Supervisor's Name and Title: _____

Highest Level of Formal Education[1] (please circle one):

High School	Associate's	Master's
GED	Bachelor's	Doctorate

- Thank you in advance for taking 15 to 30 minutes to complete this form.
- A response rate of 100% of all administrative employees is critical to the data analysis.

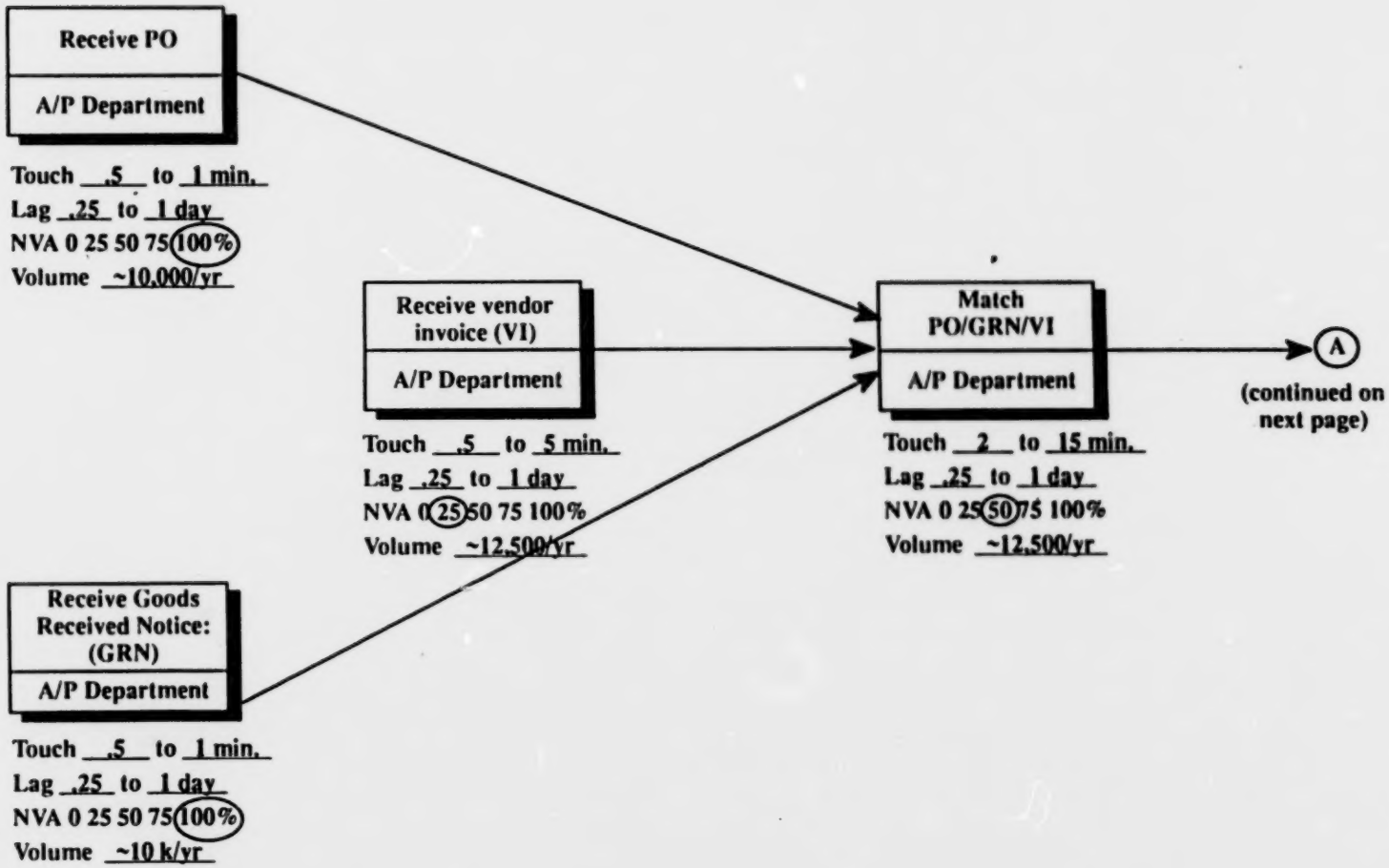
	Activity Code	Responsibility/Activity	% of Your Time
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
		Total (must sum to 100%):	

1. *Note that several other dimensions can be added to a WDC analysis. In this case, activities were analyzed not only by department but also by educational background. Therefore, the determination could be made, at a gross level, if employees were performing appropriate activities at an appropriate level.*

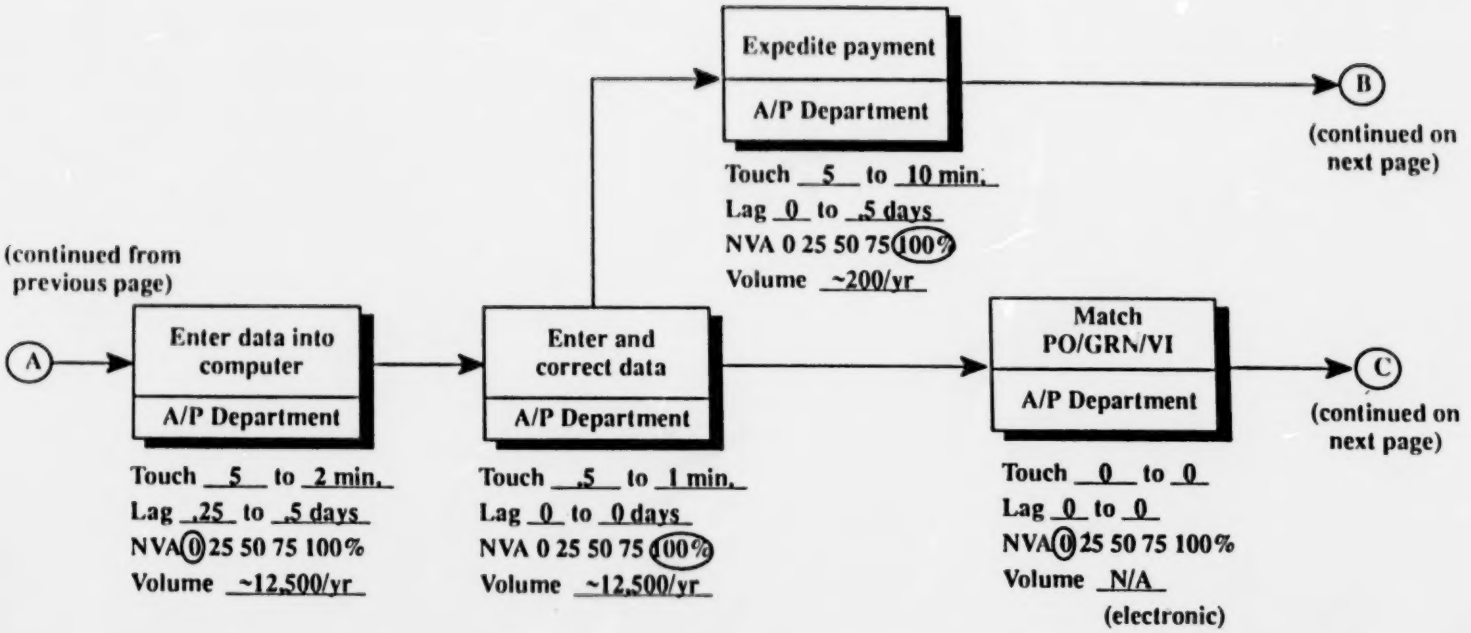
Appendix B

Process Flow Charting: Samples

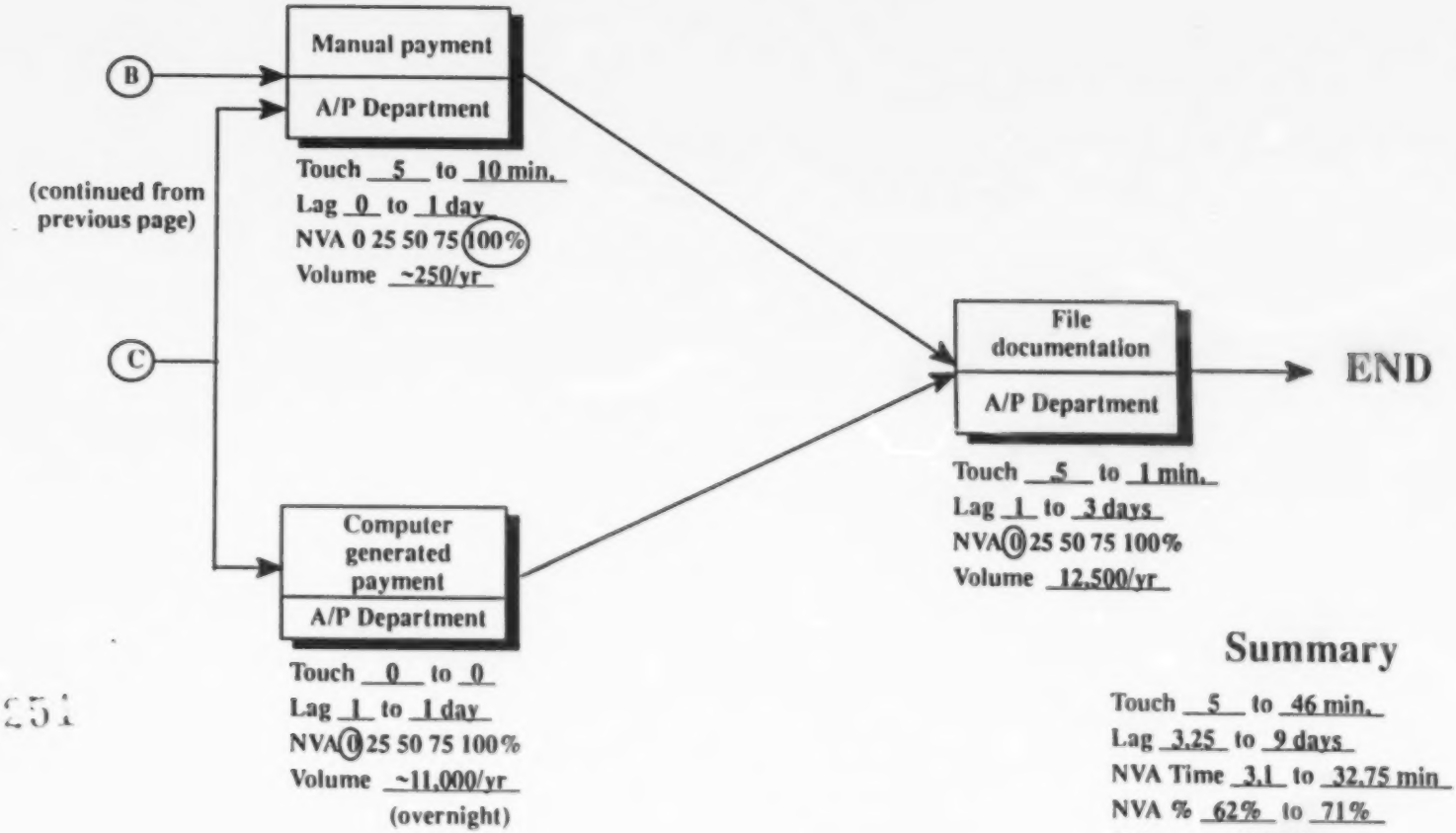
Sample of Completed Process Flow Charting Template
Process to Pay Vendor Invoice



Sample of Completed Process Flow Charting Template
Process to Pay Vendor Invoice (Continued)



Sample of Completed Process Flow Charting Template
Process to Pay Vendor Invoice (Continued)



Summary

Touch 5 to 46 min.
Lag 3.25 to 9 days
NVA Time 3.1 to 32.75 min
NVA % 62% to 71%
Volume ~12,500/yr

Appendix C

Customer Analysis: Sample Survey

Sample Survey of Campus Facilities Customers

TO: **Campus Facilities Customers**

FROM: **Business Process Redesign Project**
Phase II — Facilities Management Process

As announced in a memo from _____, the campus is now in Phase II of our Business Process Redesign (BPR) Project. As part of this effort, the BPR teams would like to better understand and *quantify* customer needs and current satisfaction with certain processes.

The BPR teams are distributing three surveys relating to:

1. The Acquisitions process
2. The Facilities Management Process
3. The Financial Transactions Process.

The attached survey is for the Facilities Management Process.

Each survey is designed to understand:

Section I — The services or areas which are most important to you as a customer or user

Section II — Your current satisfaction with these services or areas

Section III — The rank you would give to prioritize improvement efforts related to these services or areas

Section IV — A few general questions

Section V — Your specific suggestions for improvement.

Your input is important and will help us in designing the new Campus Facilities management process.

Please return this survey by _____ to _____ at _____.

If you have any questions about the Facilities Management BPR team and its efforts, please feel free to contact _____ at _____. For questions concerning the campus-wide effort in Business Process Redesign, please contact _____ at _____.

Thank you, again, for your input, your ideas and your time in completing this survey.

Sample Survey of Campus Facilities Customers (Continued)

Please return survey to _____ *at* _____
by August 6, 1993 or fax to _____.

The results of this survey will be used to identify and prioritize improvement opportunities and to measure the improvements made to the process and system over time.

For the purpose of this survey, the "Facilities Management" process includes:

- work orders submitted to Campus Facilities and/or Physical Planning and Construction
- cost accounting, recharges, and administration.

Please indicate your status: Facility____ Staff_____ Manager_____

Please list a few of the typical or recent projects or work orders you have initiated:

1. _____
2. _____
3. _____

Section 1: What is Important To You As A Customer?

In this section we ask you to rate the importance of various attributes of the Facilities Management process. Please circle the number that represents your assessment of how important each attribute is. Ten represents "extremely important" and one represents "not important at all."

Project Cost Estimates	***Least Important***									***Most Important***	
1. Provide detailed cost estimate (enough to evaluate potential costs vs. project need).	1	2	3	4	5	6	7	8	9	10	N/A
2. Provide up-front opportunity to review project cost, options or alternatives.	1	2	3	4	5	6	7	8	9	10	N/A
3. Provide functional designs within budget.	1	2	3	4	5	6	7	8	9	10	N/A
4. Provide estimates within reasonable time frame.	1	2	3	4	5	6	7	8	9	10	N/A

Sample Survey of Campus Facilities Customers (Continued)

Project Scheduling, Management and Communication	*Least Important*									*Most Important*	
5. Provide timely initial contact in response to WO request.	1	2	3	4	5	6	7	8	9	10	N/A
6. Have a clearly designated point of contact in Campus Facilities for your project.	1	2	3	4	5	6	7	8	9	10	N/A
7. Provide a schedule of work (when work is to start, estimated duration, estimated completion date prior to job start).	1	2	3	4	5	6	7	8	9	10	N/A
8. Provide periodic updates on project status and work activity.	1	2	3	4	5	6	7	8	9	10	N/A
9. Have a Project Manager available to resolve issues on job site.	1	2	3	4	5	6	7	8	9	10	N/A
10. Provide timely completion of work or project.	1	2	3	4	5	6	7	8	9	10	N/A
11. Notify customer when job is complete.	1	2	3	4	5	6	7	8	9	10	N/A
12. When costs significantly exceed estimate, provide sufficient explanation.	1	2	3	4	5	6	7	8	9	10	N/A
13. Annually publish charges for typical jobs (i.e., install bookshelf, paint room, etc.)	1	2	3	4	5	6	7	8	9	10	N/A
14. Have policies and procedures that are well documented and accessible.	1	2	3	4	5	6	7	8	9	10	N/A
15. Have policies that are consistently interpreted and applied.	1	2	3	4	5	6	7	8	9	10	N/A
16. Provide training/classes for customers to understand the WO process and the recharge accounting system.	1	2	3	4	5	6	7	8	9	10	N/A
17. Have a proactive, customer-oriented focus.	1	2	3	4	5	6	7	8	9	10	N/A

Actual Work or Expertise	*Least Important*									*Most Important*	
18. Quality of the actual construction or repair work.	1	2	3	4	5	6	7	8	9	10	N/A
19. Provide the best value for repair/construction dollars spent.	1	2	3	4	5	6	7	8	9	10	N/A
20. Advise/consulting readily available from Campus Facilities on an informal basis.	1	2	3	4	5	6	7	8	9	10	N/A
21. Expertise of Architect and Engineering staff.	1	2	3	4	5	6	7	8	9	10	N/A
22. Expertise of skilled crafts.	1	2	3	4	5	6	7	8	9	10	N/A
23. Expertise of contractors.	1	2	3	4	5	6	7	8	9	10	N/A
24. Expertise of the Work Management Group.	1	2	3	4	5	6	7	8	9	10	N/A

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Sample Survey of Campus Facilities Customers (Continued)

Cost Accounting and Financial Information	*Least Important*									*Most Important*	
25. Provide on-line ability to monitor financial status of projects.	1	2	3	4	5	6	7	8	9	10	N/A
26. Provide "user-friendly," easy-to-understand recharge reports.	1	2	3	4	5	6	7	8	9	10	N/A
27. Provide accurate recharges.	1	2	3	4	5	6	7	8	9	10	N/A
28. Provide timely up-to-date recharges.	1	2	3	4	5	6	7	8	9	10	N/A
29. Completed project comes in at or close to estimated project cost.	1	2	3	4	5	6	7	8	9	10	N/A

Section 2: Your Current Satisfaction Rating

In this section please rate the same attributes you rated above according to how satisfied you are with them. Please circle the number that represents your satisfaction level with these issues using a scale in which 10 is very satisfied and 1 is extremely dissatisfied.

Project Cost Estimates	*Dissatisfied*									*Satisfied*	
1. Provide detailed cost estimate (enough to evaluate potential costs vs. project need).	1	2	3	4	5	6	7	8	9	10	N/A
2. Provide up-front opportunity to review project cost, options or alternatives.	1	2	3	4	5	6	7	8	9	10	N/A
3. Provide functional designs within budget.	1	2	3	4	5	6	7	8	9	10	N/A
4. Provide estimates within reasonable time frame.	1	2	3	4	5	6	7	8	9	10	N/A
Project Scheduling, Management and Communication	*Dissatisfied*									*Satisfied*	
5. Provide timely initial contact in response to WO request.	1	2	3	4	5	6	7	8	9	10	N/A
6. Have a clearly designated point of contact in Campus Facilities for your project.	1	2	3	4	5	6	7	8	9	10	N/A
7. Provide a schedule of work (when work is to start, estimated duration, estimated completion date prior to job start).	1	2	3	4	5	6	7	8	9	10	N/A
8. Provide periodic updates on project status and work activity.	1	2	3	4	5	6	7	8	9	10	N/A
9. Have a Project Manager available to resolve issues on job site.	1	2	3	4	5	6	7	8	9	10	N/A
10. Provide timely completion of work or project.	1	2	3	4	5	6	7	8	9	10	N/A
11. Notify customer when job is complete.	1	2	3	4	5	6	7	8	9	10	N/A
12. When costs significantly exceed estimate, provide sufficient explanation.	1	2	3	4	5	6	7	8	9	10	N/A

Sample Survey of Campus Facilities Customers (Continued)

Project Scheduling, Management and Communication	***Dissatisfied***									***Satisfied***	
13. Annually publish charges for typical jobs (i.e., install bookshelf, paint room, etc.)	1	2	3	4	5	6	7	8	9	10	N/A
14. Have policies and procedures that are well documented and accessible.	1	2	3	4	5	6	7	8	9	10	N/A
15. Have policies that are consistently interpreted and applied.	1	2	3	4	5	6	7	8	9	10	N/A
16. Provide training/classes for customers to understand the WO process and the recharge accounting system.	1	2	3	4	5	6	7	8	9	10	N/A
17. Have a proactive, customer-oriented focus.	1	2	3	4	5	6	7	8	9	10	N/A
Actual Work Expertise	***Dissatisfied***									***Satisfied***	
18. Quality of the actual construction or repair work.	1	2	3	4	5	6	7	8	9	10	N/A
19. Provide the best value for repair/construction dollars spent.	1	2	3	4	5	6	7	8	9	10	N/A
20. Advise/consulting readily available from Campus Facilities on an informal basis.	1	2	3	4	5	6	7	8	9	10	N/A
21. Expertise of Architect and Engineering staff.	1	2	3	4	5	6	7	8	9	10	N/A
22. Expertise of skilled crafts.	1	2	3	4	5	6	7	8	9	10	N/A
23. Expertise of contractors.	1	2	3	4	5	6	7	8	9	10	N/A
24. Expertise of the Work Management Group.	1	2	3	4	5	6	7	8	9	10	N/A
Cost Accounting and Financial Information	***Dissatisfied***									***Satisfied***	
25. Provide on-line ability to monitor financial status of projects.	1	2	3	4	5	6	7	8	9	10	N/A
26. Provide "user-friendly," easy-to-understand recharge reports.	1	2	3	4	5	6	7	8	9	10	N/A
27. Provide accurate recharges.	1	2	3	4	5	6	7	8	9	10	N/A
28. Provide timely up-to-date recharges.	1	2	3	4	5	6	7	8	9	10	N/A
29. Completed project comes in at or close to estimated project cost.	1	2	3	4	5	6	7	8	9	10	N/A

Sample Survey of Campus Facilities Customers (Continued)

Section 3: Priority Ranking

In this section, please select the top 5 most important areas for improvement and rank them 1 to 5. One is the most important and 5 is somewhat less important. Please only select a total of 5 choices.

_____ Provide detailed cost estimate (enough to evaluate potential costs vs project need).
_____ Provide up-front opportunity to review project cost, options or alternative.
_____ Provide functional designs within budget.
_____ Provide estimates within reasonable time frame.
_____ Provide timely initial contact in response to WO request.
_____ Have a clearly designated point of contact in Campus Facilities for your project.
_____ Provide a schedule of work (when work is to start, estimated duration, estimated completion date prior to job start.)
_____ Provide periodic updates on project status and work activity.
_____ Have a Project Manager available to resolve issues on job site.
_____ Provide timely completion of work or project.
_____ Notify customer when job is completed.
_____ When costs significantly exceed estimate provide sufficient explanation.
_____ Annually publish charges for typical jobs (i.e., install bookshelf, paint room, etc.)
_____ Have policies and procedures that are well documented and accessible.
_____ Have policies that are consistently interpreted and applied.
_____ Provide training/classes for customers to understand the WO process and the recharge accounting system.
_____ Have a proactive, customer-oriented focus.
_____ Quality of the actual construction or repair work.
_____ Provide the best value for repair/construction dollars spent.
_____ Advise/consulting readily available from Campus Facilities on an informal basis.
_____ Expertise of Architect and Engineering staff.
_____ Expertise of skilled crafts.
_____ Expertise of contractors.
_____ Expertise of the Work Management Group

Sample Survey of Campus Facilities Customers (Continued)

_____ Provide on-line ability to monitor financial status of projects.

_____ Provide "user-friendly," easy-to-understand recharge reports.

_____ Provide accurate recharges.

_____ Provide timely up-to-date recharges.

_____ Completed project comes in at or close to estimated project costs.

Section 4: General Information

1. Would you be interested in attending training classes to understand the Work Order process and the recharge accounting system? _____Yes _____No

2. Do you use a manual file or computerized system within your department to track Work Order project status and/or project financial information? _____Yes _____No

Section 5: Additional Suggestions For Improvement

Please list any other areas you feel should be addressed as problematic and any suggestions you might have for improving the process. Feel free to use the back of this sheet for your improvement suggestions.

Thank you very much for your participation and please be sure to return the survey to _____ at _____ by _____.

Sample Survey of Customers of the Acquisition Process

TO: **Customers of the Acquisition Process**

FROM: **Customer Voice Representative, on the Acquisitions Team of the Business Process Redesign Project, Phase II**

As you have read, the campus is now in Phase II of our Business Process Redesign Project. As part of our project, we need your assistance in completing this survey of customer needs and satisfaction.

There are currently three surveys circulating on campus: Acquisitions, Financial Transactions and Facilities. This survey is for Acquisitions; if you also get surveys for the other processes, we encourage you to fill them all out, as your opinions and perceptions are important to us. Your input will help us to design the new campus acquisitions process and we need it to serve your needs.

Please return this survey by _____, to _____ at _____. Should you have any questions about the Acquisitions Team and this project, please feel free to contact _____ at _____. For questions concerning the total Business Process Redesign Project, please contact _____ at _____.

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Sample Survey of Customers of the Acquisition Process (Continued)

Surveys due to _____ *at* _____
by _____.

Definition: The "Acquire Goods" process covers all the steps from the time you request the purchase of some item until the time you receive the item and it is paid for.

I am a: Faculty_____ Staff_____ Manager_____

Please list a few of the typical or recent items you have purchased:

1. _____
2. _____
3. _____

Section 1: What is Important?

In this section we ask you to rate the importance of a list of attributes of an acquisition process. Please circle the number that represents your assessment of how important each attribute is. Ten represents "extremely important" and one represents "not important at all."

	Not Important								*Extremely Important*		
1. Timely delivery of goods	1	2	3	4	5	6	7	8	9	10	N/A
2. The goods satisfy expectations	1	2	3	4	5	6	7	8	9	10	N/A
3. Good value for the money spent	1	2	3	4	5	6	7	8	9	10	N/A
4. Easy and trouble-free order placement	1	2	3	4	5	6	7	8	9	10	N/A
5. Ability to track orders	1	2	3	4	5	6	7	8	9	10	N/A
6. Ease in resolving issues with problem orders	1	2	3	4	5	6	7	8	9	10	N/A
7. On-line vendor/product information	1	2	3	4	5	6	7	8	9	10	N/A
8. Control over product selection	1	2	3	4	5	6	7	8	9	10	N/A
9. Prompt payment of vendor	1	2	3	4	5	6	7	8	9	10	N/A
10. Availability of unit's purchasing activity information	1	2	3	4	5	6	7	8	9	10	N/A
11. Availability of account/fund balance information	1	2	3	4	5	6	7	8	9	10	N/A
12. Ability to lien all purchases at time of origin	1	2	3	4	5	6	7	8	9	10	N/A

Sample Survey of Customers of the Acquisition Process (Continued)

	Not Important									*Extremely Important*	
13. Easy tracking of payment status	1	2	3	4	5	6	7	8	9	10	N/A
14. Availability of expert advice on campus	1	2	3	4	5	6	7	8	9	10	N/A
15. Clarity and consistency in purchasing policies and procedures	1	2	3	4	5	6	7	8	9	10	N/A
16. Availability of demonstration models for examination/trial	1	2	3	4	5	6	7	8	9	10	N/A
17. Ability to reach live person on telephone	1	2	3	4	5	6	7	8	9	10	N/A
18. Ability to interact with single buyer for all purchasing needs	1	2	3	4	5	6	7	8	9	10	N/A
19. Purchasing training available	1	2	3	4	5	6	7	8	9	10	N/A
20. Reduced number of authorizations	1	2	3	4	5	6	7	8	9	10	N/A
21. On-line purchasing system integrated with on-line financial system	1	2	3	4	5	6	7	8	9	10	N/A
22. On-line policies and procedures	1	2	3	4	5	6	7	8	9	10	N/A
23. Good vendor relations	1	2	3	4	5	6	7	8	9	10	N/A
24. Reduced need for purchase justifications	1	2	3	4	5	6	7	8	9	10	N/A
25. On-campus storehouse for basic supplies	1	2	3	4	5	6	7	8	9	10	N/A
26. Method to handle rush orders	1	2	3	4	5	6	7	8	9	10	N/A
27. Other: _____	1	2	3	4	5	6	7	8	9	10	N/A

Sample Survey of Customers of the Acquisition Process (Continued)

Section 2: Performance Rating

In this section we ask you to rate the same attributes you rated above according to how well they are performed., Please circle the number that represents your satisfaction level with these issues using a scale in which 10 is excellent and 2 is extremely poor and 1 is not done at all.

	Extremely Poor/ or Not Done									*Extremely Well*	
1. Timely delivery of goods	1	2	3	4	5	6	7	8	9	10	N/A
2. The goods satisfy expectations	1	2	3	4	5	6	7	8	9	10	N/A
3. Good value for the money spent	1	2	3	4	5	6	7	8	9	10	N/A
4. Easy and trouble-free order placement	1	2	3	4	5	6	7	8	9	10	N/A
5. Ability to track orders	1	2	3	4	5	6	7	8	9	10	N/A
6. Ease in resolving issues with problem orders	1	2	3	4	5	6	7	8	9	10	N/A
7. On-line vendor/product information	1	2	3	4	5	6	7	8	9	10	N/A
8. Control over product selection	1	2	3	4	5	6	7	8	9	10	N/A
9. Prompt payment of vendor	1	2	3	4	5	6	7	8	9	10	N/A
10. Availability of unit's purchasing activity information	1	2	3	4	5	6	7	8	9	10	N/A
11. Availability of account/fund balance information	1	2	3	4	5	6	7	8	9	10	N/A
12. Ability to lien all purchases at time of origin	1	2	3	4	5	6	7	8	9	10	N/A
13. Easy tracking of payment status	1	2	3	4	5	6	7	8	9	10	N/A
14. Availability of expert advice on campus	1	2	3	4	5	6	7	8	9	10	N/A
15. Clarity and consistency in purchasing policies and procedures	1	2	3	4	5	6	7	8	9	10	N/A
16. Availability of demonstration models for examination/trial	1	2	3	4	5	6	7	8	9	10	N/A
17. Ability to reach live person on telephone	1	2	3	4	5	6	7	8	9	10	N/A
18. Ability to interact with single buyer for all purchasing needs	1	2	3	4	5	6	7	8	9	10	N/A
19. Purchasing training available	1	2	3	4	5	6	7	8	9	10	N/A
20. Reduced number of authorizations	1	2	3	4	5	6	7	8	9	10	N/A
21. On-line purchasing system integrated with on-line financial system	1	2	3	4	5	6	7	8	9	10	N/A

Sample Survey of Customers of the Acquisition Process (Continued)

	Extremely Poor/ or Not Done									*Extremely Well*	
22. On-line policies and procedures	1	2	3	4	5	6	7	8	9	10	N/A
23. Good vendor relations	1	2	3	4	5	6	7	8	9	10	N/A
24. Reduced need for purchase justifications	1	2	3	4	5	6	7	8	9	10	N/A
25. On-campus storehouse for basic supplies	1	2	3	4	5	6	7	8	9	10	N/A
26. Method to handle rush orders	1	2	3	4	5	6	7	8	9	10	N/A
27. Other: _____	1	2	3	4	5	6	7	8	9	10	N/A

Section 3: Relative Importance

Please select your top 5 most important factors and rank them 1 to 5 in order of importance to you. One is most important and 5 somewhat less important. Please select only 5 choices from the list.

_____ Timely delivery of goods
_____ The goods satisfy expectations
_____ Good value for the money spent
_____ Easy and trouble-free order placement
_____ Ability to track orders
_____ Ease in resolving issues with problem orders
_____ On-line vendor/product information
_____ Control over product selection
_____ Prompt payment of vendor
_____ Availability of unit's purchasing activity information
_____ Availability of account/fund balance information.
_____ Ability to lien all purchases at time of origin
_____ Easy tracking of payment status
_____ Availability of expert advice on campus
_____ Clarity and consistency in purchasing policies and procedures

Sample Survey of Customers of the Acquisition Process (Continued)

_____ Availability of demonstration models for examination/trial
_____ Ability to reach live person on telephone
_____ Ability to interact with single buyer for all purchasing needs
_____ Purchasing training available
_____ Reduced number of authorizations
_____ On-line purchasing system integrated with on-line financial system
_____ On-line policies and procedures
_____ Good vendor relations
_____ Reduced need for purchase justifications
_____ On-campus storehouse for basic supplies
_____ Method to handle rush orders
_____ Other: _____

Thank you very much for your participation and please be sure to return the survey to _____ at _____ by _____.

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